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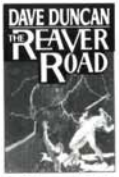

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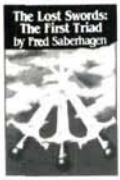

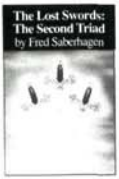

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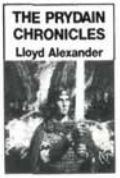

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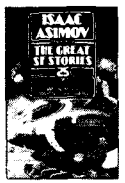

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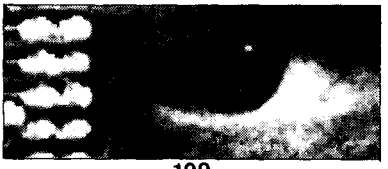

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EDITORIAL Stanley Schmidt

INAPPROPRIATE TECHNOLOGY

A few months back (June 1992) I had a piece here called "Accept No Substitutes," commenting on the logical fallacies in the belief that computer simulations can replace animal experiments in research labs and classrooms. Despite the ire of a reader or two who complained that I did not address this or that aspect of the "vivisection" controversy, that controversy *per se* was not my subject. My subject was inappropriate technology: the common practice of using one technology to do a job more appropriate to another.

Animal experiments provide only one example of this, in which the specific inappropriateness involves using computer simulations to do a job that can only be done properly using the Real Thing. Presumably people are tempted to do such things because they forget that a simulation *is* a simulation, necessarily imperfect, more or less similar but by no means identical to the thing being simulated.

Inappropriate technology does not, of course, have to involve computer simulation. It's easy to think of things that can be done with one set of tools but would be better done with another. You could, for example, swat flies with a sledgehammer or slice bread with a band saw. You're not likely to want to, though, if you're familiar with the virtues of a simple flyswatter or bread knife.

The particular example that draws me back to this topic does involve computer simulation, in a context so irresistibly bizarre that I just *had* to tell you about it, once I was convinced that my informant wasn't kidding. A teacher in a major school system (which will remain nameless) tells me that an effort is underway there to replace shop and home economics courses with computer simulations.

Not to supplement—to *replace*.

Honest!

Now, I won't say flatly that com-

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puter simulations will *never* be able to include such subtleties of real shop or kitchen work as the feel of a saw vibrating in your hand and trying to wander off the line you've drawn for it to follow, or the sawdust-inspired need to sneeze in the midst of a delicate operation, or a drill bit freezing up and snapping off in the eighteenth hole in a crucial piece, or one pot boiling over while you must continuously stir another. Certainly the virtual reality people are working toward being able to provide that kind of sensory detail, but they have a long way to go. I will say quite confidently that the computers available in a high school *now* are not ready to provide that kind of experience—and that such experience is an essential part of learning to function in a real shop or kitchen.

Even if and when computer simulations can provide that kind of detail, I doubt that they will be allowed to. They might do a splendid simulation of a workplace in which everything functions the way it's supposed to, but such a workplace bears little resemblance to the real world. A simulation may teach theory beautifully, but unless it incorporates Murphy's Laws in all their glory, it will be far from adequate preparation for using cranky real tools on obstinate real materials.

And I see no way it will teach *safety* as it should. There's a profound psychological difference between work in which you run a real risk of slicing off your thumb, and simulated work in which you run no risks at all, no matter how many simulated deadly mistakes you make. Until I see convincing evidence to the contrary, I must suspect that the latter will not sufficiently develop the attitudes you need for the former.

I'm not the only one concerned about the tendency to leap into use of inappropriate technology—or, more accurately, inappropriate applications of technology. (A real wood shop or kitchen is far from non-technological; it's just that a naked computer is not the *right* technology for building a cabinet or cooking a meal!) Last July, for example, *Newsweek* ran an essay by Robert J. Samuelson called "Technology in Reverse," about "retarded technology" that "creates new and expensive ways of doing things that were once done simply and inexpensively." He has some good examples, such as video press releases that are expensive to

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produce and ship and will not get even a glance from people who would actually read, at least quickly, an old-fashioned paper release. He correctly points out that the new-found ease of number-crunching and rapid communication often means that people plunge headlong into doing those things when some deliberate *thinking* might be more useful.

Some of his other examples are less convincing. He scoffs at electronic books as a very expensive and inconvenient way of doing what paper books do conveniently and cheaply. The numbers he cites suggests that he hasn't paid much attention to the economic evolution of electronics. Yes, it's still possible to pay $900 or $9,000 for a book-reading computer, and $20 for a disk to put in it. But that's a temporary situation. I remember the first all-electronic calculator I saw: it had the size and weight of a very large office typewriter, did only the most basic arithmetic operations, and cost $3,000. Functionally equivalent ones the size and shape of a credit card are now sold at supermarket checkouts along with chewing gum, or given away as advertising gimmicks. Electronic books are expensive enough *now* to qualify as inappropriate technology for most of us—but the chances are excellent that a very few years will push demand up and prices down to the point where they're quite competitive.

Samuelson also ignores the fact that new technologies tend to *become* appropriate because they are

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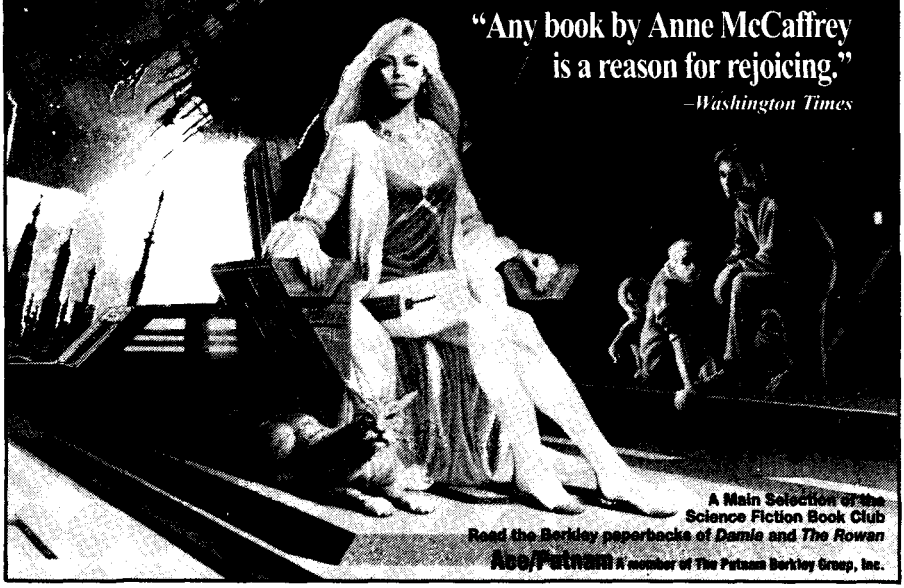

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not just expensive and frivolous new ways to do simple old jobs, but make it possible to do new things, some of which are worthwhile. His contention that a school library with 2,000 books can theoretically serve 2,000 readers at once, while a library with one computer terminal that can access 200,000 books can only serve one, utterly misses the point. The book-only library will never find 2,000 customers each of whom wants only a single book, and a different one from anybody else. By the time a library is able to access 200,000 books, it will not have just one computer terminal. More likely every student will own a cheap pocket reader that can dip into any of those books—even if several others are doing the same.

Mr. Samuelson's ridicule of "personal digital assistants" like the Apple "Newton" has similar weaknesses. He thinks a Rolodex or a standard address book is better because "they already accept handwriting." He ignores the fact that the electronic version, unlike the paper, makes it very easy to make changes, and to cross-link related lists like names, addresses, and appointments. I agree that, at its introductory price of close to $1,000, Newton's advantages are not worth that much to me. But when the price falls by a couple of orders of magnitude, as calculator prices did, they may well be.

I currently have two address files that let me make a direct comparison of functional advantages. My portable copy is a little book which, as Mr. Samuelson points out, accepts handwriting. But my friends and relatives keep moving, so I have to cross out entire old listings and write in entire new ones, generally out of logical order. Eventually I'll run out of places to put new ones, and then (if I'm still using such things) I'll have to buy a new address book and manually rewrite *all* the listings—a tedious process at best. With my computer file, on the other hand, when I hear of an address change I need only call up the listing and change the appropriate words or numbers. Everything stays uncluttered and in order, and keeping up to date is unobtrusive and painless. So when something combining the flexibility of the computer with the portability of the notebook becomes available at a low enough price, I'll consider the technology very appropriate.

I admit that my own approach to these things is a mite atypical; and from one point of view, it's probably good that it is. I seldom buy the very newest technologies; I like to wait until most of the bugs have been tamed and the price has come down. Samuelson observes that many people immediately rush out to buy the newest technologies simply *because* they are the newest technologies. In this, I think, he is completely right. I've long been convinced that most people, at least in this country, do things not because they are the most reasonable things to do, but because they are a current Fad—and many of them will follow virtually *any* fad, no matter how stupid or pointless.

I don't agree, though, that stupid and pointless fads necessarily be-

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The blow smashed into her skull.
For the briefest of moments, she regained consciousness. It might have been a split second after the attack, or two hours later, she could not say. But she saw them, there was no doubt of that. She saw the feet, the two red metallic feet, not thirty centimeters from her face...
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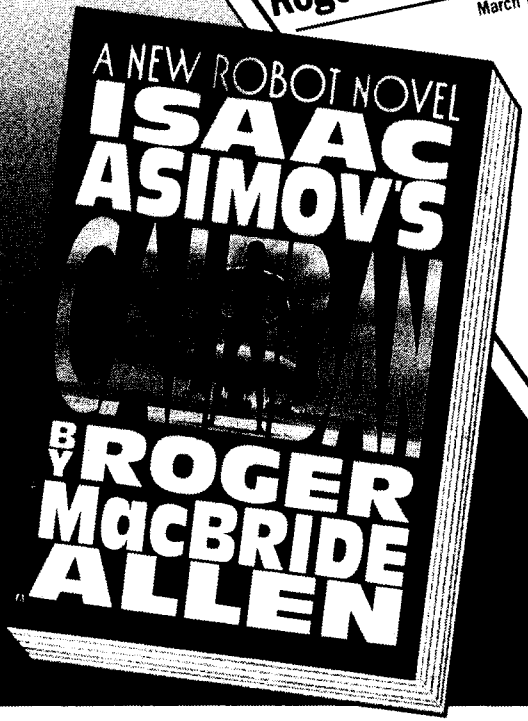

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come permanently entrenched because of the investments people have made in them. Too many of the people who follow fads are always looking for new ones, and can afford to move on to them despite having squandered considerable sums on earlier ones.

And the fad leaders and followers do serve an important evolutionary purpose. As Samuelson says, "Every new technology inspires the temptation to see what it will do—no matter how inane or time-consuming the task." That's a good thing—because trying out all the possible applications is the best possible way to discover which ones are actually worth adopting and which are not. This is not to say that evolution always selects for "the best," in technology any more than in biology. But on the whole, an application that has shown itself to have significant value to many people is more likely to become popular, and continue to be used, than one that has been found to be a waste of time.

It only makes sense to use high technology for things that it does better and/or cheaper than other methods. But sometimes only *trying* alternate methods makes clear which is most appropriate—and sometimes the answer is that Method A is better for Job C, and Method B for Job D. Enthusiasm for a new method which is very good for one purpose should not lead to its being used for other purposes to which it is unsuited. Neither should the fear of jumping on inappropriate bandwagons lead anyone to reject new methods for jobs that they *do* fit well.

Computer simulations, for example, can be a very important *part* of education. Flight simulators enable pilots to gain at least some experience with highly dangerous situations to which they could not be intentionally exposed in real aircraft. Virtual surgery will eventually be a useful adjunct to cadaver dissections, bridging the gap between Gross Anatomy 101 and real live patients by allowing young doctors to work on somebody whose heart beats and blood flows, but who can't die (or sue). I can even imagine simulations being a useful addition to a wood or metal shop course, by guiding students through the outlines of more problems and projects than they could complete in available real time.

But I see all these things as supplements, not substitutes. By all means, use them where they're appropriate; but don't be fooled into thinking they can do the whole job. Ultimately a pilot must handle a real plane with real passengers, and a surgeon must operate on patients who *can* die or sue.

And while a vanguard of people who can't wait to get their hands on the newest technology serve the important purpose of feeling for its useful boundaries, and some of their experiments may be silly or wasteful, an institution entrusted with educating an entire generation needs to give a bit more thought to its choices. Even if a school board is composed of individuals who like to hop on fashionable bandwagons, those individuals should keep each other's faddish im-

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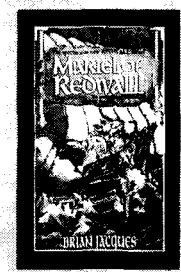

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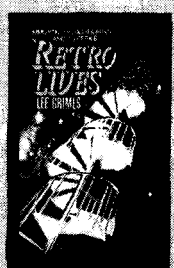

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pulses in check. They should apply a certain amount of judgment to deciding beforehand which approaches are most *likely* to be appropriate.

One might hope, in other words, that even a board of education would eventually recognize that a cooking course needs a kitchen—not just an electronic picture of one—and a wood shop needs a wood shop. ■

IN TIMES TO COME

Our April issue features two novelettes, both parts of popular ongoing series, and utterly different from each other. The cover is for Charles Sheffield's "The Invariants of Nature," a suspenseful tale involving Jeanie Roker and McAndrew (of "inertialess drive" fame) in a new kind of skulduggery that isn't quite what either of them thinks—or the title may suggest. Deeper into the issue you'll find Grey Rollins's "Spoiled Rotten," which, as the title suggests, poses a new challenge for Victor, that alien sleuth of irrepressible ingenuity and . . . er . . . distinctive tastes.

Two short stories, by Ben Bova and Jerry Oltion, also form a sort of pair, in that they're based on two sharply contrasting pictures of Mars and human approaches to it. We'll also have a fact article called "Goat Island," by L. Sprague de Camp, about some simple principles of ecology that human beings seem to find extraordinarily difficult to grasp. And, of course, the Conclusion of Maya Kaathryn Bohnhoff's serial *Squatter's Rights.*

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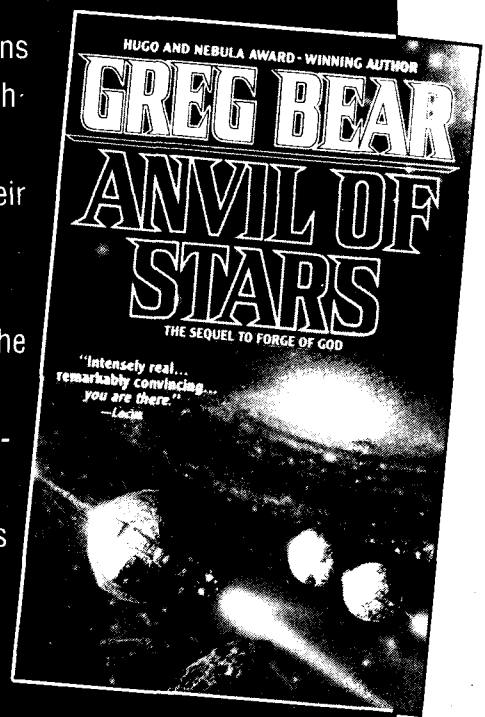
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It was her second week on Velvet, and Danetta Price still couldn't take her eyes from the largest window of whatever room she was in. Just now she was in the living room of the colonial governor's suite, waiting for him to dress for dinner. An afternoon of successful trade negotiations had left her in a mellow mood perfect for enjoying spectacular views. And this view was spectacular.

Beyond the curving window, the broad main avenue of Haifa stretched to the sharp boundary between town and country, punctuated by the golden glow of gravlamps floating serenely along its length. Its buildings stood, gleaming and gemlike, in a setting sun—colors few Earth cities had seen shimmering in full light, muting in shadow. And beyond the buildings, Velvet.

Greens almost too vivid to be appreciated by the human eye vibrated in field and furrow, hill and vale. The sky overhead was a furious shade of blue-violet, its hues more penetrating than the skies of Earth even at midday. It was always populated by at least a handful of large, dark blue-grey clouds. Currently, some snuggled up against the distant western mountains the colonists had dubbed the "Great Smokies." They were heavy clouds —rolling up to a place and exuding mist the way a fat, grey cat exudes love while rubbing against its favorite pair of legs. They were beautiful.

Beautiful, too, was the dark, fertile soil of Velvet. It ranged from oxide red through a color almost burgundy, to the richest, nightest black Danetta Price had ever seen. That, and the

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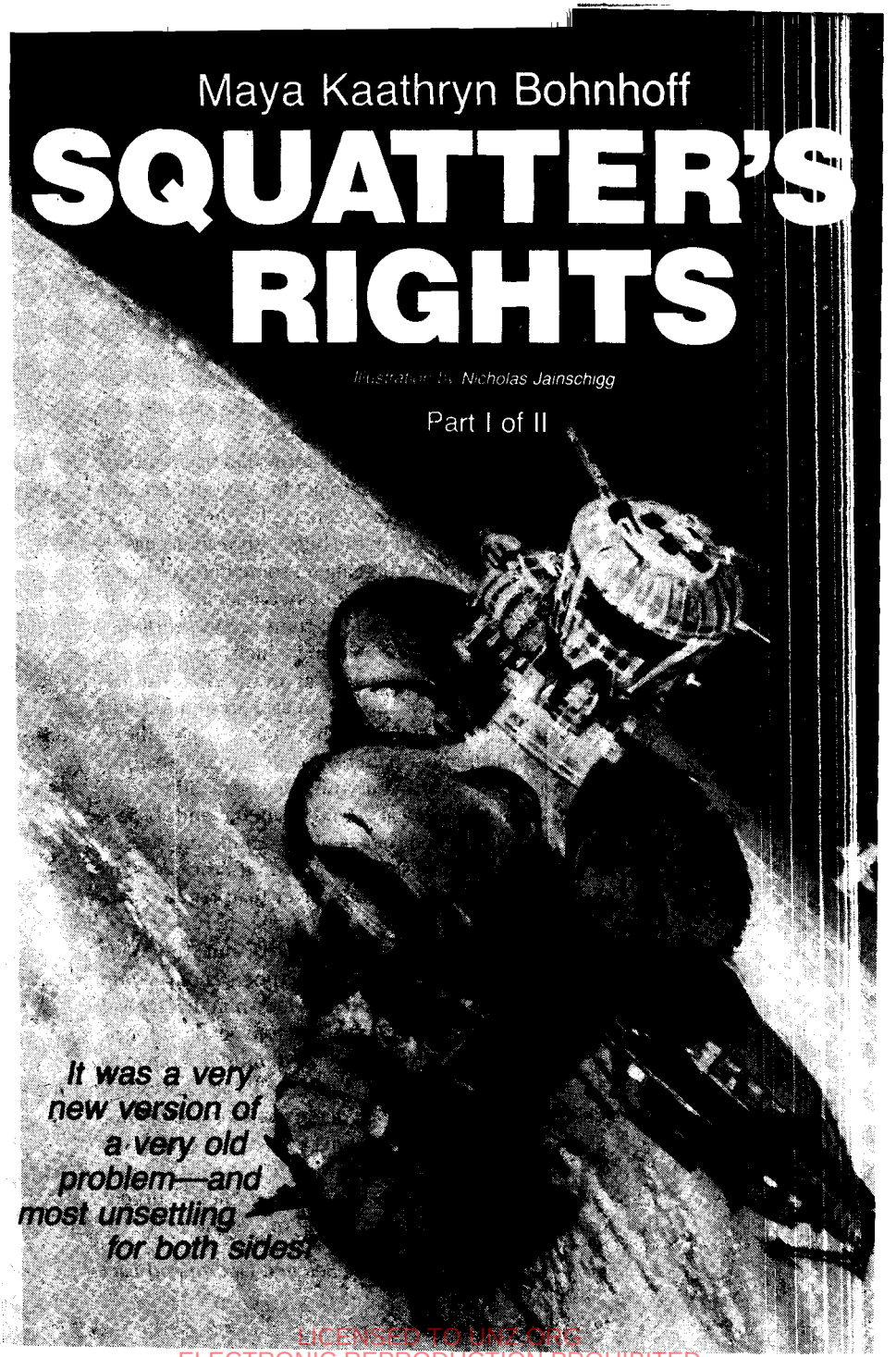
Maya Kaathryn Bohnhoff

SQUATTER'S RIGHTS

Illustrator: Nicholas Jainschigg

Part I of II



It was a very new version of a very old problem—and most unsettling for both sides!

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eternally twilight sky and those leaden puffs of cloud, contrived to make everything green look *extraordinarily* green, and that contributed to the overall effect that you were living in a velvet painting—hence, the popular name Velvet.

Danetta sighed aloud as the sun (Bronte, by name) sank to the horizon, pulling in its palette of colors.

"Addictive, isn't it?" asked a warm voice behind her.

Danetta turned. Governer Joseph Bekwe stood in the doorway straightening his neck-scarf and tucking one end fashionably back over the collar of his shirt.

She answered the smile in his eyes and nodded. "I can't seem to stop staring out of windows. It's almost a relief when the sun goes down."

"You'll have to take some holocubes back to Earth with you to remember us by," he said.

Danetta's eyes went back to the window where Bronte was icing the clouds with flame, using up some leftover golds and oranges. She didn't want to think of going home—going back to Earth, she corrected herself. She wasn't honestly sure she thought of it as home anymore. She had no family there and she traveled so much that no place was home—or even like it. She had to allow that Velvet wielded a stronger magic than any place she'd yet visited. Magic—that's what Rhys Llewellyn would call it. The thought of her eccentric chief negotiator made her smile.

"A penny for them," said Bekwe, moving into the room.

"I was just thinking how Rhys would react to this world. It's almost as colorful as he is."

"Rhys? Oh, yes. Llewellyn—the Scottish gentleman, isn't it? The one who wears full Highland regalia to the conference table? Llewellyn is a Welsh name, though, isn't it?"

Danetta nodded. "His mother was Welsh, and his Scottish father, a McCrae, took her surname when they married. Something in the nature of a family feud, as I understand it. Suffice it to say, the rebel McCrae and the rest of his clan are not on speaking terms. . . . You know, I'm half tempted to tell him to get his kilt out here and enjoy the scenery, but he'd just end up out in the hills with your archaeologists digging up some choice ruins."

Governor Bekwe chuckled. "Well, unfortunately, ruins are in short supply here. A thing which our archaeologists bewail at every opportunity. Now," he put an arm around her and patted her shoulder. "You've been most patient and kind and I shall reward you with a five-star dinner."

"Deal," said Danetta and broadened her smile, reminding herself that she was accruing more reasons to linger on Velvet than could be accounted for by the scenery.

They were nearly out the door when the governor's housecomp chimed and informed him that he had an urgent call. He grimaced apologetically and excused himself to answer it. When he returned, the expression on his face made Danetta suspect her five-star dinner was a lost cause. His words confirmed it.

"There's been a rather . . . urgent development. I'm afraid . . ." He

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spread his hands in a gesture of regret.

"I understand. Occupational hazard. Nothing serious, I hope."

He found his shoes of sudden interest. "Unfortunately, it is . . . rather serious. And not something I can discuss, I'm afraid. Look, Danetta, I'd like this to be a postponement, not a cancellation."

Danetta smiled. "Definitely not a cancellation."

He looked at her just a little more intently than one human being usually looks at another, and Danetta was pleased that her heart could still do somersaults after so many sedentary years.

Her hotel was close; she declined Joseph's offer of a cab ride and strolled the pale, sequined walkways instead. There were other people on the street—colonists and early tourists alike. She could see that tourism was going to be an important industry on this beautiful world. She took a deep breath of the temperate night air. By God, it even *smelled* vibrant.

Her aide, Astrid Henke, was surprised to see her, but allowed that an early turn-in might benefit the morrow's negotiations. With that in mind, Danetta took Astrid's hint, ordered from room service and retired.

There were no negotiations the next morning. Danetta Price awoke to a call from the governor's office saying that due to unforseen circumstances, all officers involved with the trade talks were otherwise occupied.

"That was it?" She stared at the columnar holo-display with vague disbelief. Governor Bekwe's aide, her face frozen in a tight smile, faded from view. Danetta turned to her own aide, a mild frown creasing her forehead. "No explanation whatsoever," she observed. "Curiouser and curiouser."

Astrid smiled. "And I'd say the White Rabbit, there, was a mite rattled by it all, wouldn't you?"

"Well, she certainly didn't look comfortable." Danetta fluffed her sleep-disheveled hair and sighed. "Looks like we've got us a free day in Wonderland, my dear. How about a leisurely breakfast?"

"Sounds ripping. Why don't you shower down? You look like somebody's lost spaniel."

"Thank you, so much," murmured Danetta and shuffled off to the bathroom.

To a more caste-conscious corporate CEO, sarcasm on the part of a subordinate was not to be tolerated, no matter how good-natured it might be. But Danetta Price was not an average CEO and Astrid Henke, her chief executive aide of many years, was no average subordinate. In fact, Danetta, who had been a renegade among Tanaka Corp's officers since she had been among Tanaka Corp's officers, found it difficult to think of Astrid as a subordinate at all. She was more than aide-de-camp. She was congenial companion, friend, fashion consultant, and nanny. And Danetta was quick to admit she often consulted Astrid on business and political matters as well. They got along so well, Astrid said, because they were of an age, blonde, equally attractive, and

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were drawn to completely different types of men.

They walked to breakfast. Everyone walked in Haifa. Danetta assumed it was because you could see the scenery much better on foot and keep it in sight for longer periods of time—without causing any road accidents. Even indoors people were loathe to leave the outdoors, and windows had assumed a singular importance. They were uniformly large, unobstructed, and often ornately framed, bringing the landscape into the interior decor. The restaurant they chose for breakfast was no exception. The entire eastern wall of the dining room was a panel of seamless glazine. From the fifth floor of a shopping complex, it looked out on the stunning flank of Mount Carmel and her receding train of taller sisters.

Danetta and Astrid, lazing over breakfast with their eyes glued to that sweep of nature, sighed in close harmony, then laughed.

Danetta shook her head. "I'd feel absolutely idiotic if everybody else wasn't ogling the scenery too. Look at that. How does a mountain get to be that exquisite shade of purple?" She gestured languidly at the uneven crests marching toward the horizon. She could just see the paler violet veins of snow along the rough peaks.

"I don't know," said Astrid, "but if I had eyes that color, I'd be dangerous."

Danetta sighed. "I suppose I ought to have you set up some business meetings for me today."

"Gosh. As if you can't think of anything better to do with a free day?"

"I'm open to suggestion."

"All right. Let's be tourists. There's a wavetram that runs up to Carmel. And we can visit the museum—you have to be able to tell Professor L you visited the museum."

Danetta had to admit, Astrid's plan sounded a heck of a lot better than hers. She grinned. "Tourism, it is."

Their tour took in Haifa and the lower slopes of Mount Carmel, depositing them, at mid-afternoon, in the settlement's museum. The native artifacts were few but fascinating; particularly the artwork.

"How did they achieve this effect?" Danetta was studying a large, squarish shard of a material that could have been either ceramic or metal. It was black. Solid black, she would have said, but it was not quite solid. It had a peculiar sheen to it—a depth of field that made her suspect that if she poked a finger into it, nothing would stop the thrust.

Then there were the colors. They were part of the black; they moved through it kinetically, tugging the eye with a tease of blue, a hint of sunset, a shimmer of Velvet green. But trying to focus on the color brought about a frustration of the senses. The directed eye saw only black, while the rainbow of hues skittered temptingly out of the way to linger just on the edge of sight.

The museum guide, himself a member of an archaelogical team, grinned as if he knew exactly what she was thinking. "Quite honestly, Ms. Price, I can't tell you about the medium. We're not even certain about the exact makeup of the base

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Magnus knew quite well that Rod Gallowglass had stayed on Gramarye because he had fallen in love with Magnus's mother. He knew it not just from his parents' report, but from several others of the older generation who had witnessed it—including Fess. And anything the children had done had been incidental. Until now.

—Excerpted from *A Wizard in Absentia*

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material. And the coating process is an absolute mystery." His eyes said that was just fine, that he loved mysteries, that he wouldn't have it any other way. He took the tile from its shoulder-high pedestal and held it out to her. "Here, hold it for a moment. Tell me what you think."

Danetta did as asked and was at once surprised. The thing in her hands vibrated—well no, that wasn't quite right. Her brow puckered into a frown. She ran tentative fingers over the obsidian surface. Her eyes said the object was solid, or at least dense, and its surface, smooth; but her fingertips told tales of silken fabric, mist-cool liquid, grains of sand. There was a faint aroma like strawberries. She tilted the tile. No, it was grass, wet grass. And she heard water rushing over rocks . . . or was that the whisper of wind? She peered at the shifting surface. Her eyes slipped after an image—was that a face? And wasn't this a building with graceful, upswept eaves?

Grinning, shaking her head, she handed the shard back. "This would make one great advertising medium. Wherever that place is, I'd sure like to find it."

The guide chuckled. "Amazing, isn't it?"

"Almost . . . hallucinogenic."

Astrid, her hands extended toward the object, pulled them away. "Are we talking curry-coniptions here, or serious hallucinations?"

"Oh, be a woman about it, Astrid," Danetta chided her. "It's really lux. *Hold* it, for pity's sake."

Their guide laughed outright, relinquishing the artifact to Astrid. "You ought to visit the dig up on the Mount," he told them. "Velvet's been pretty stingy with her mementos of past tenants, but there've been some good finds."

They did visit the dig in the waning afternoon, both of them falling in love all over again with Velvet's excessive lushness as they took the wavetram up to the archaeologist's base camp on the mountain's northern flank. On the advice of the museum guide they introduced themselves to a Dr. Gedde Kuskov, who gave them a tour, first of the cataloguing room, then of the dig, keeping them safely out of the way of the working teams.

"*It must be difficult for your crew* to keep their eyes on their plots with all this around." Leaning against a staunch guardrail, Danetta gestured at the deeply cleft gorge running east toward Carmel's bigger, more imposing sisters. Snow-capped, they loomed against the azure afternoon sky like a chain of rough-hewn pyramids built for giant pharoahs more wealthy and greedy than Earth had ever seen.

Dr. Kuskov nodded, smiling a completely distracted smile. "One must learn to focus tightly. Of course, when one *unfocuses* and stands up to take a breather, one is likely to fall right over again. The Sisters can be a bit overwhelming."

"Glad I don't have acrophobia," said Astrid unconvincingly. She swallowed and glanced west toward the valley. "Or a fear of wide open spaces."

"The museum guide said you don't

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know a lot about Velvet's past inhabitants," prompted Danetta.

"True. We know they were a fairly advanced race—or at least partially so. While we've uncovered evidences of an agrarian society, cities, some art—as you've seen—and some technology, all we know with any certainty is that the technology was sufficient to destroy the entire society."

"Planet-wide?"

Kuskov nodded. "Planet-wide."

"Any chance they didn't do it to themselves? I hate to think of any race being that stupid."

"I suppose there's a chance of that. Although, we did uncover an artistic record that seems to chronicle the loosing of some sort of . . . plague. It's highly subjective evidence, though." He scratched his head, sending a lock of thick, long, and already unruly hair into complete rebellion. "You handled the artifact at the museum?"

Danetta nodded.

"This is very similar, except that those of us who have held it. . . . Well, I could show you what I certainly can't describe with any justice. Are you interested?"

"Certainly," said Danetta eagerly, and saw Astrid's eyes roll back into her head.

The artifact Dr. Kuskov showed them was a chipped ball the size of a child's head. It seemed to be composed of the same type of material as the black tile from the museum, but the predominant color was a deep lacquery red. Like the other piece, it had an evasive sheen of secondary colors and shapes that skittered and slithered at the periphery of vision.

Dr. Kuskov put the orb into Danetta's hands. She very nearly handed it right back to him. The sensations it evoked were not pleasant and though she could not say why, she was impressed that the artifact told a story of war, betrayal and environmental poisoning. She smelled death, saw it, heard its pitiful cries. Such futility. . . .

"Are the animals really all dead?" she asked in a small, childlike voice as she watched Kuskov return the globe to its container.

He nodded ruefully. "With the exception of some sea life, some burrowing rodents, and some particularly hardy insects, yes. We've had to import the few animals we have. The botanical team suspects that entire species of plant life must also have been lost due to the destruction of the animals and insects charged with pollinating them."

Danetta was finding it difficult to shake off the mood brought on by handling the globe. "What sort of plague was it?"

"The bio-techs tell us there were several agents at work. One had roughly the effects of scrappie."

"Scrappie?"

"Spongiform encepholomyelitis. It infected sheep and cows on Earth up until the mid-twenty-first century. It's an unpleasant disease that permeates the soil and causes the brains of its victims to, um, well, turn into sponges, almost literally."

Danetta grimaced. "Sounds hideous. Is there any chance of a resurgence?"

Kuskov smiled. "Dear God, no. If there were, none of us would be here.

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Our survey teams gave the planet a completely clean bill of health. This all happened a couple thousand years ago."

"A couple thousand?"

"At least two thousand, near as we can determine."

"But if it was an environmental disaster—a plague—why aren't there more artifacts?"

Kuskov shook his head. "I wish we knew. It's as if someone was around to clean up afterward. We suspect, for example, that Haifa is sitting on the site of a major city, yet we haven't found any but the most trivial of evidence. Rather, it's the absence of any significant ruins that make us suspect this. The area looked as if it had been artificially . . . scoured. Only the mountain areas have yielded much of archaeological interest. In fact, we've uncovered what is obviously a man-made roadbed right here." He gestured toward the high end of camp. "We've excavated a good twenty miles of it, heading back up into the mountains."

"Might they have achieved space travel?" asked Danetta. "Might some of them have escaped?"

Kuskov gave her an almost apologetic look. "I doubt it. We've seen nothing to suggest that level of technology existed. Indeed, to suspect that such a destructive race was capable of long-distance space travel is contrary to Ziolkowska's Axiom: That any race of men capable of space travel must have successfully survived its self-destructive phase and achieved the capacity for concerted and sustained effort necessary to develop the resources essential to the endeavor."

Danetta smiled and applauded lightly. "Word for word. That was quite a mouthful."

Gedde Kuskov returned the smile and bobbed a slight bow. "And, I hope, a true mouthful, for everyone's sake."

Danetta was thoughtful on the tram ride back down the mountain, wondering about the past masters of Velvet. Did the people responsible for those beautiful artifacts really destroy themselves, or had someone else done it for them?

It was nearly dark when the wave-tram slowed on its approach to the landing platform. The lights of Haifa glittered like a stole of stars. Danetta, feeling exceptionally contented, was looking forward to a quiet dinner and a hot bath.

"My God, what's that?"

Astrid's startled whisper yanked her out of her lazy-hazy mood. She glanced up through the clear flexiglass dome of the tram, following Astrid's gaze. Two huge ships hovered over the heart of the little city, bathed in an eerie glow of their own making. They were so close Danetta felt as if she could reach out and touch them.

Before she could react to their presence, one of the ships emitted a spray of intense yellow beams that resolved into what could only be described as a web of light. The web fell softly, dreamily, like a fabric of faery dust until it blanketed the city. The lights of Haifa went out.

Danetta gasped and Astrid uttered a frightened yelp as the tram, hov-

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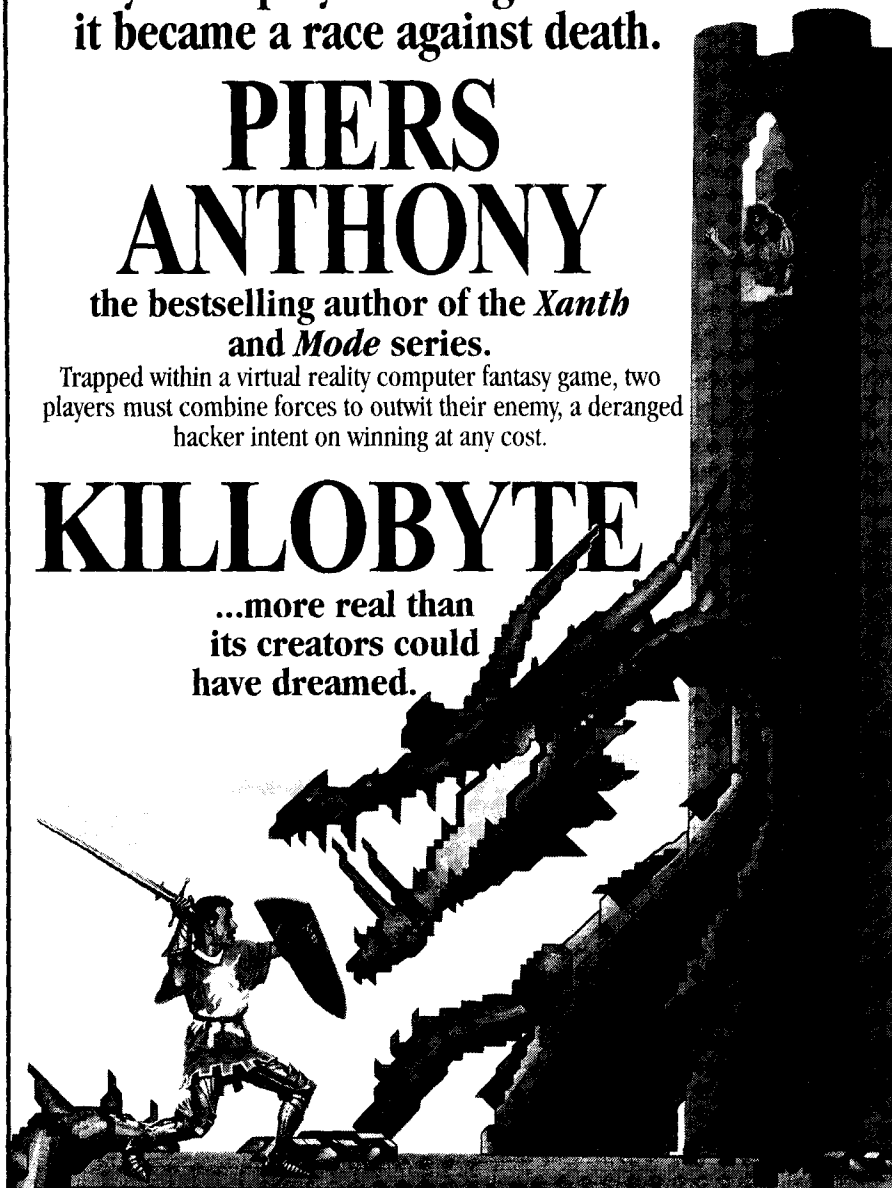

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ering just over the landing platform, dropped like a stone. It hit the alloy decking beneath it and rocked crazily for several seconds before coming to a gradual rest.

Danetta swallowed noisily, daring to loose her fingers from the armrest of her padded seat. "A-astrid? Are you all right?"

"Just ducky, thank you." She moved slightly and the tram carriage wobbled. "Well, ain't this grand?"

Danetta stifled a chuckle. "We're alive, anyway. I'd hate to think what might have happened if that net had fallen while we were hanging out over the countryside."

"You could have gone all night without saying that."

Danetta got carefully to her feet. The carriage rocked gently from stem to stern, but showed no sign of capsizing. "Come on," she said. "Let's see if we can get out of here."

They got out easily, springing the door latch and stepping out onto the darkened landing platform. They made their way cautiously across that expanse to the lev-tubes. Astrid put her hand through one curving, open doorway into the tube's interior.

"Guess what?" she said. "No levitator. Got a rope?"

"I suppose we could buckle our belts together and go overside, but I'll just bet you they wouldn't reach."

"Damn, and I thought being thin and svelte could never have its downside."

"Seriously though, there should be an emergency stair." Danetta glanced around. In the muted glow from the settled webbing, she could make out precious little, but logic told her the emergency exits would be to the left and/or right of the lev-tubes. She started to her right, drawing Astrid after her.

"Ah-ha!" she crowed after a moment of pawing the wall. "One steel door pad. *Pres*-to!" She pushed against the pad and was rewarded when the door clicked open. A rectangle of utter blackness met her eyes.

"No," said Astrid, emphatically. "Absolutely not. I will wait here until a certain metaphoric realm of eternal damnation freezes over before I will set one foot in that Stygian *pit*."

Danetta opened her mouth to respond, then yelped as lights came up on every side, blinding her. Nearby, the lev-tubes wooshed and hummed to life; behind them, the little tram car shot upright two feet, then settled to the pad once again. A voice roared out of nowhere: "Are you all right? Ladies? Ms. Price?"

Danetta recognized Dr. Kuskov's voice and exhaled the breath she'd been holding for the last minute and a half. "Yes, Doctor. We're fine. The tram was on the platform when the power failed. What happened?"

"No clues, here, I'm afraid. We just saw the-the *whatever* it was from those ships. All the lights in town went out—they're back on now, though," he added.

Danetta nodded, then remembered he couldn't see her. "We're going to go on into town. I hear sirens, I think, and we're OK, so—"

"Are you sure?" He sounded anxious. "Shouldn't you maybe come back up here until . . . well, until we

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know what happened?"

Astrid muttered something acerbic under her breath.

"What was that?" asked Kuskov. "I didn't quite hear."

"Uh, my companion doesn't want to take a chance on the tram right at the moment. Thanks anyway, Doctor. I think we'll be all right."

They took the lev-tube to the walkway below and peeked out from beneath the eaves of the building. The web of alien light was gone; the sky was clear, star-spangled and empty of hovering spacecraft. They walked briskly down the lighted walk toward the museum. There, they were forced to assure the staff that they were none the worse for their adventure, and gleaned from those anxious individuals little more about the alien presence than they had gotten out of Gedde Kuskov.

None of them had even seen the spacecraft parked overhead. The lights had gone out; the power had gone off; the automatically controlled doors were frozen shut and by the time they'd managed to find the manual mechanism and open them, the mysterious web had melted away.

"It seemed to affect the surface vehicles, too," noted one observant soul. "I saw a couple of ground cars out there with their lights out, just sitting in the middle of the boulevard."

The two women went outside onto the sidewalk. It sparkled beneath their feet—a billion-billion tiny chips of reflective silicate spitting back at the stars and gravlamps overhead. Normal. Everything looked normal and calm. If it weren't for the slightly larger-than-average crowd in the streets (all looking up) and the wail of sirens from midtown, this would be just another night in Haifa.

They found a taxi about a block away. The driver, a gregarious young woman with a pronounced New Australian accent, told them everything they already knew with unconcealed glee. She'd been in her cab when it happened; she saw the streets suddenly brighten, then everything went dark except for a watery, yellow glow, then her E-motor died.

"T'was surreal, ladies. I'm tellin' you. Surreal. I gets out, see. And up there, through the holes in the light-net, I sees these ships. Bloody wahsome, t'was. Big ole bogies. One of 'em was kinda weird lookin' though, y'know. Kinda like I was seein' it in a puddle. I think that must've been the one that was workin' the net." She waved her hand in an undulating pattern and glanced back over her shoulder to see if her audience was suitably impressed.

Danetta, ever the diplomat, asked the question the cabby obviously wanted to be asked. "Weren't you afraid? To get out of your car like that, I mean."

The girl shook her head, sending three ponytails swaying. "Naw. Not this ole girl. I been to th' Outback. I seen things hell of a lot stranger than any ole bogies. Gawd, machinery don't give me shakes. But *nature*, well, that's worth a few chilly-bumps." She flicked a finger against a holocube that dangled from the rear-view monitor on her console. Carmel

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and her sisters marched away into its faux-3D infinity.

"That's why she's here, I'd lay odds," commented Astrid when they'd debarked at their hotel. "Nature in all her wah-some glory. That 'ole girl' *loves* her damn chilly-bumps."

"Come on, Astrid, admit it. You love chilly-bumps just as much as the next person."

"Ah. The next person. That would have to be you. Danetta Price, closet thrill-seeker. Confess, sister. You were one big chilly-bump up there on that landing platform tonight."

Danetta nodded. "You bet. I was scared. There were alien ships parked over my head and I was standing in the dark a long way from the ground and I was scared. And I can't help thinking that if that light-web had fallen just a few seconds earlier. . . ."

Astrid made a diving motion with one hand. "Plop," she said tonelessly.

"Yeah. Plop."

There were three messages on the comlink. All of them were from Joseph Bekwe. All of them were expressive of great concern for Danetta's well-being. She threw Astrid a wry glance. "*Now*, he wants to talk to me."

Astrid shrugged. "Go fish. Maybe you can get him to tell you what this is all about."

"Maybe, nothing. He's *going* to tell me."

Half an hour later, in his office at the Colonial Administration complex, he did tell her, albeit, reluctantly. "We were trying to handle it without alarming the entire colony," he said, rubbing a hand over his face. Even through the rich ebony of his skin, Danetta could see that he was wan, probably from lack of sleep.

"Well, I think you can safely say it's alarmed now. Were there any casualties?"

He shook his head. "No, thank God. We had a few people that were caught in lev-tubes when it happened, but the emergency let-down systems worked perfectly in every case."

"Who are they, Joseph? What do they want? Or do we know that yet?"

"We've met. We've talked. I'm not sure we've communicated. We've had the Dynamic Translator working on their language since they arrived, but I think there are some subtleties to it we're missing. All we know with any certainty is that they call themselves the Tsong Zee and that they're laying claim to Velvet. They want us to leave."

Danetta was stunned. "Leave . . . ? Just like that? Pack up your thousands of people and your lives and get out? Joseph, this colony has been here for twenty-five years. Why are they just now getting around to evicting you?"

"I don't know. The claim seems highly suspicious to me. Some of my advisors think they must be after the minerals. As you know, Velvet is astoundingly rich mineralogically. One of our mining companies hit a particularly rich vein of copper last month; they might have been waiting in the wings for us to begin bringing up treasure."

"How would they know?"

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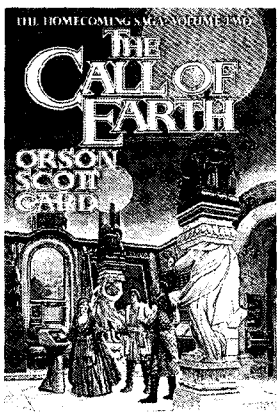

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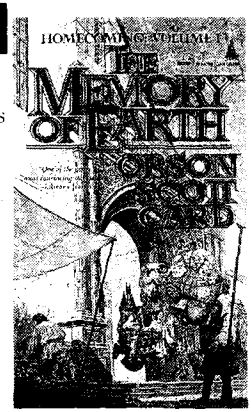

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Bekwe shrugged. "Beats me. Unless they've been visiting at intervals—maybe waiting for the bio-toxins to disperse. I don't know what they're basing their claim on. Our archaeologists are unanimous about the fate of the native race—the bio-plague devastation was total and there is absolutely no evidence that any of the cultures extant had achieved space travel."

"Could Velvet have been a colony world? The technology might have been developed elsewhere."

"Doubtful."

"So, they've no more right to be here than we have." Danetta shrugged, spreading her hands.

"Which we intimated—insofar as one can intimate across a DT field. That was what this evening's little display was all about—might makes right. They want us to know they have the power to remove us forcibly if need be."

Danetta experienced an unsettling thought. "Maybe they removed the original inhabitants the same way. Maybe they figure Velvet is theirs by right of conquest."

Joseph's face went grey. "If they're responsible for . . . Dear God, I hope you're wrong."

"Me too. Have you explained to them what moving a colony like this would entail?"

"We've tried. They seem to understand, but the demand hasn't changed. They evidently want us all off the planet as soon as it is humanly possible."

"Is it humanly possible to leave Velvet?" Danetta asked. "Logistics aside, I'd be willing to bet there are folks here who'd rather fight and die then leave."

Joseph Bekwe grimaced wryly. "I think you're looking at one of them."

"What do you do next?"

"The Tsong Zee have imposed what they call a Time of Silence—to drive the point home, I can only imagine. Then we're scheduled to talk to them again. The DT should have a clearer sense of the language by then." He shook his head. "It's odd, Danetta, the language seems so *simple* to be coming from such an obviously advanced race of men. They have a high level of technology—high enough to transport them through space in large numbers, yet the language is almost . . . childlike in its simplicity."

"Are they somebody's pet pirates, do you think? Working under instructions they don't really understand?"

He sighed. "I don't know. I just know we're at the mercy of that damned Translator. I know it's worked just fine for decades. I know it's got a track record like an Olympic decathlete. But somehow, in a situation like this, it's so damned hard to put complete trust in a computer. There's so much at stake. After tonight's display, I don't doubt their ability to immobilize or annihilate an entire city."

"Don't you have any linguists on staff here?"

"Everything but. There were a few here early on, but they all took off for greener pastures, linguistically speaking. There was nothing for them to do. The few little scraps and chips Dr.

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Kuskov and his cronies have pulled out of the ground have told us next to nothing about the last masters of Velvet. There was no written material at all."

Danetta stared thoughtfully at her fingernails—pale gold this time of year, to remind her that on Earth it was summer. "I mentioned a colleague of mine, a Rhys Llewellyn."

"Several times."

"He's an anthropologist—by Divine Revelation, I think—and a linguist. He's been a godsend to Tanaka in sticky situations with new races of men. I'd be willing to call him in on this."

Joseph was shaking his head. "I don't want to endanger anyone else. We're a captive audience, but bringing someone new onto the scene—"

"Joseph, he's a specialist. He knows how to deal with delicate situations like this. I just have a feeling he might be able to . . . fill in the gaps left by the translation program."

He raised his hands against her sudden increase in earnestness. "I'm not convinced we can't handle this with the people we've got. I'm just a little tired and frustrated right now. And if worse comes to worst, there's a military outpost on Duet."

"Military?" repeated Danetta, her alarm cubing. "Oh, please, let's not have a war. I think this planet's seen enough devastation."

"Well, that sort of depends on *them*, doesn't it? If they'd rather blow the place apart than let us have a piece of it. . . ."

She leaned forward in her chair and put her hand on his arm. "Let me call in Rhys. He's vacationing on Pa-Loana. He could be here in less than two days. Please, Joseph. He can make a difference."

Bekwe glanced down at her hand, then met her eyes warily. "Sounds like you're pretty sold on this guy. I'm surprised he's not here, already."

It was his expression that brought Danetta into sharp focus on what his words really meant. She actually blushed. "Good Lord, Joseph! He's about half my age!"

The governor cocked his head to one side and brushed fingertips across the back of her hand. "That isn't the big deal it once was, Danetta. Fifty isn't even middle-aged these days. What's a quarter of a century between friends?"

"Uh-huh. And that's just what Rhys and I are—friends. Very good friends."

Joseph nodded, still not meeting her eyes, forcing her to stare at his curly mop of salt and pepper curls. "Right."

"He's a nerd, Joseph. A sweet, slightly mad, conscientious nerd. I have never understood nerds, and I feel slightly out of my depth whenever they're around." She leaned forward a little further. "Joseph . . ."

He looked up so quickly, they nearly bumped noses.

"Let me call him in."

"I'll think about it."

She patted his cheek. "Fine. You think. I'm going to eat. It's been hours since lunch and I'm starved." She got up abruptly and headed for the door. "You look like you could use a dinner break, yourself."

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"Couldn't eat anything. Too tense."

Danetta paused at the door and surveyed his somewhat rumpled form. "Rule number one of corporate negotiating: Never deal on an empty stomach."

"This isn't exactly corporate negotiation."

"No, you're right. It's much more critical, isn't it?"

He grinned ruefully. "Touché. I'll have something brought up."

"Good. Let me know when you want me to call Rhys." She slipped through into the outer office where she collected Astrid.

"There are some very nervous people on our dear governor's staff," her aide noted as they made their way down to street level. "One might almost say terrified. What's the inside story—or can't you tell me?"

"I haven't been sworn to secrecy. The situation is about as we suspected."

"Alien invaders?"

"OROM, Astrid," Danetta corrected, reflexively, "Other Race of Men. Not aliens. And not invaders, precisely. I mean, technically speaking, we're alien invaders on Velvet, too."

Astrid's neat brows arced toward her hairline. "Philosophy, she gives me. Come on, Danetta. *Everybody's* an alien invader *somewhere*. What's going on? What do they want?"

"Well, according to the DT, they want their planet back." She felt a tiny charge of glee that she'd surprised her unflappable aide.

"*Their* planet? How so?"

"Evidently, they're claiming it as a colony world, or part of their empire or—" She shrugged. "Who knows? The language barrier has made understanding difficult."

"Ah. And how does Governor Bekwe plan on establishing the veracity of this claim—or is that a moot point?"

"It could be. If all their ships are as big as the two we saw and all their weapons as debilitating as that one. . . ."

"And I suppose they want us off the planet, or else?"

"That would seem to be their intent. It's hard to tell."

Astrid rolled her eyes. "Oh, please hold that thought. I think you may have discovered a great new diet plan—absolute terror before dinner."

Astrid's tone was typically light and dry, but Danetta was watching her eyes and saw that the humor never reached them.

Another message from the governor's office met them upon their return to the hotel. The man, himself, appeared in the holo-column, dressed in fresh, unrumpled clothing, but looking no less disturbed than he had earlier.

"Danetta," he said. "Call me. Whatever time you get back—call me."

She stepped into the link field immediately and did that; she was connected, without comment or question, direct to the governor's office. Joseph practically pounced at her image.

"What is it?" she asked. "What's happened?"

"I need your help, Danetta. You're

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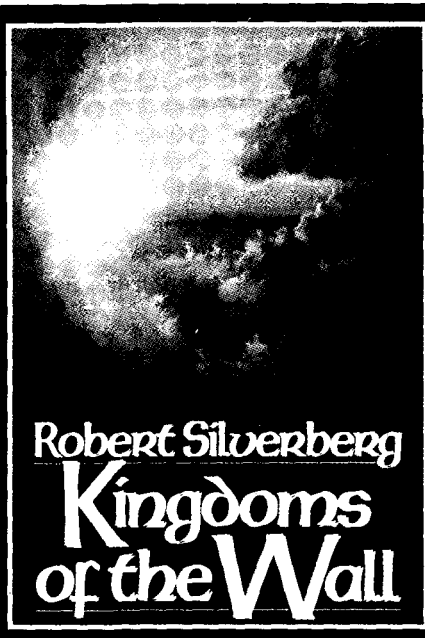

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a trained negotiator; you've had a hell of a lot more experience dealing with other races of men than I have—than any of my staff has. We've got to strike some kind of understanding with these people. We've got to make them understand our position. We—"

"Whoa! Whoa!" Danetta held up both hands against his rapid-fire assault. "Slow down. What's happened?"

"If we don't either give in or come up with something new to say to the Tsong Zee, they're going to show us another display of their military might and I'd hate to think what that could mean. So far, no one's been hurt, but—"

"Yes, I know. But, Joseph, I'm no expert at dealing with OROM. My reputation is built on inter-*Human* relations; that's what I do best. I keep telling you—it's Rhys Llewellyn you want. He's—"

"Danetta, the time—"

"Two days, maximum. He can be here virtually the moment he leaves Pa-Loana."

"How do we stall them?"

"Tell them something new. Tell them you want to summon a special negotiator."

"I've plastered them with negotiators already."

Danetta rubbed her forehead, feeling a dull ache rustling there. "Look, who negotiates for the aliens—I mean, the OROM?"

"There are four of them. They seem to be of equal rank. They have acolytes or, um, assistants of some sort, but the four seem to be equal."

Danetta furrowed her brow. "No one spokesperson?"

"They take turns."

"Turns. How? One speaks for ten minutes then passes the baton? How?"

"Er, they-they seem to alternate questions." He glanced back over his shoulder to someone out of his column's range. "Isn't that how you'd describe it? Yes, alternating." He turned back to Danetta.

"Wardrobe. What's the wardrobe like?"

"Huh?"

"What are the four delegates wearing? How is it different from what their assistants are wearing?"

"They're dressed in, uh, shinier stuff." He nodded over the shoulder, again. "Yes, it's a lot shinier—like their skin. Their skin is very shiny. And brighter colors. They seem to wear more reds and oranges. Things that contrast with their skin."

Danetta nodded. "OK. Acolytes, you said. What made you say that?"

"I meant assistants."

"Right. But you said acolytes. What made you use that word?"

He thought about that for a moment, shaking his head. She knew he thought she was asking completely irrelevant questions; he was only answering them because he trusted her—and he didn't have anything better to do. Except sleep.

"Acolytes," she repeated sharply. "Why?"

He made a frustrated gesture. "Veneration. OK? They seem to venerate the delegates."

"Ah. But not as grunts to commanding officers?"

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Joseph cocked his head and gazed at her musingly. "No. Not like that at all. More like . . . acolytes or-or apprentices." There was a murmur of voices from out of sight. Joseph nodded. "Exactly. They didn't just sit back and ignore the proceedings. They sat close to their delegates and watched everything with great interest."

Danetta's head came up from its thoughtful repose. "One acolyte for each delegate?"

"Yes."

"Do they use the same word they use to refer to themselves in referring to you? Does it translate the same?"

"No. They call themselves, um, Speakers. They call me Administrator."

"Tell them you wish to have a Human Speaker come to talk to them."

"Why?"

"A Speaker may be a holy man, a wizard, a high priest. Whatever it is, we need to produce one. Tell them our Speaker wishes to talk to them and that he can be here in one or two Velvet days."

"Tson," said Joseph absently. "They call the planet Tson."

"Great. Fine. But don't start using their name for it. Not yet. That's implicitly granting their claim. Hear them when they call it Tson and make sure they acknowledge you when you call it Velvet. Arrange clearance for the TAS packet and I'll get Rhys here as fast as the Spectrum will allow. Are we agreed?"

Governor Bekwe nodded, aware, on some level of his weary being, that Danetta Price had just taken control of the situation. He didn't resent that. He hadn't the energy even if he'd been so inclined. At the moment, he was grateful.

"Fine," she said. "And Joseph, get some sleep—as soon as you arrange for my message to get out. If you can't sleep, I'll send Astrid over with a mallet. Got it?"

He smiled. "I'll drink a cup of valerian."

"Acceptable. Good night, Joseph." She cut the link.

"What are you smiling about?" Astrid stood in the door to her bedroom, a silky dressing gown hiding her woven twytex long johns.

"I was just being idiotically shallow. Here we have an OROM menace hanging over our collective heads and I'm sitting here thinking that Rhys would be proud of me."

"Good job, huh?"

Danetta shrugged. "Well, I think I asked all the right questions. . . . I hope."

"Well, then Rhys probably will be proud of you. Hey, if we all die tomorrow, you might as well go out on a high note."

Danetta shook her head, her smile widening to a grin. "Thank you, Astrid. You are a true friend."

"Yes, I am. Well, it was nothing. I'll see you in the morning—sooner, if our hovering friends do something exciting. Good night." She turned and swept into her room, leaving a yawn suspended in midair.

—2—

Rhys Llewellyn sighed self-indulgently and sketched a loving salute

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at the profile of Pa-Loana that floated serenely beyond the broad viewport of the Time-Altered Space Vessel *Campion*. It was not exactly a sigh of regret, for his vacation had reached that peculiar pass wherein the thought of going back to work elicits almost as much of a mental tingle as the thought of not going back to work. Given another week on Pa-Loana, he would be longing for the negotiating table again—yearning to bury himself under a pile of research papers and field reports.

"Sir? They've announced Shift stations, sir."

Rhys turned and found himself looking down into the earnest face of his second assistant, Yoshi Umeki. Yoshi's face was always earnest and, though Rhys had tried to surprise in it any other expression, he had failed. The young woman smiled earnestly, worried earnestly, thought earnestly, and possessed the most earnest anger Rhys Llewellyn had ever seen.

He smiled at her and tugged the fat, blue-black braid that lay across her left shoulder. "Is Roddy battened down, then?"

She smiled back earnestly and nodded. "He never woke up from the Shift in, sir." She leaned toward him, waxing confidential. "I think he overdid the local herbals at his last stop, sir. You know how he hates the Shift."

Rhys nodded and escorted his assistant inward toward the passenger's quarters at the ship's core. Roderick Halfax, his first assistant, was one of a mercifully rare group of people who found the Shift through the temporal spectrum of TA space extremely discomfitting. If awake, he suffered severe vertigo, nausea, disorientation and hallucinations; if merely sleeping, he was beset by nightmares so disturbing as to be the envy of a horror novelist. Either way, the experience was always followed by intense depression. These days he made the spectral transit from one set of space-time coordinates to another heavily sedated or not at all.

Rhys didn't mind Shifting, although he had to admit a certain sense of disarrangement (or derangement) if the duration of the Shift was more than a few seconds. For this Shift—a long one to Blue Seven—he would sleep, making use of an herbal tisane given him by one of the delightful natives of Pa-Loana, a Shaman named Pa-Lili.

He thought of her fondly as he took his potion, donned his Shift goggles, and lay down upon his bunk. He wore her fetish bag around his neck, carried a good deal of her wisdom in his heart and, if she had been human, very likely would have asked her to marry him. There had been times when he thought he might ask her regardless of her physiological persuasion.

When he awoke from his herbally-induced snooze, seemingly only seconds later, he knew Pa-Loana was light-years away and was reliving the beginning of the past week. Well, that wasn't strictly true. He was reliving the beginning of the past week light-years away from where he actually was when last week really happened. Well, that wasn't strictly true either, because last week on Pa-Loana was

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still happening with him in it and he was really, at this waking moment, in two places at one time and it was really too much effort to muddle through temporal dynamics in his currently groggy state. He gave it up.

He heard his bio-trace quietly announce that he was still extant and watched it broadcast his vital signs across the holographic lenses of his Shift goggles. When the same quiet, efficient computer voice told him the bio-trace was complete and he could get up, he did, pleased that he experienced no vertigo at all. He was always pleased about that—had been every one of the eighty-some-odd times he had Shifted. It left him in a good mood to succor those less fortunate than he.

He let himself out of his cabin and went to check on his assistants. Both were fine. Yoshi took to Shifting quite as well as he did, and Rick Halfax had been too deeply unconscious to take it any way at all. He was cheerfully groggy during their twenty hour orientation layover in Blue Seven, and went just as cheerfully back under for the last, nearly instantaneous leg of their journey—forward again to the Clear range, this time orbiting Velvet instead of Pa-Loana.

Rhys stayed awake this time, sitting upright in his darkened cabin, taking a certain enjoyment from the stretched moment of weightless, bodiless, careless, aurora whirl that was the Spectral Shift. A slow-motion explosion of color, it was; and he always came away from it certain he had seen hues and shades human eyes were not made to grasp. Since he could not describe them, the truth of that was irrelevant. But Rhys believed in the unseeable colors with the same stolid conviction he now felt about magic.

They arrived in the Bronte system within seconds of when they had left Pa-Loana and established a distant synchronous orbit with the capitol city of Haifa. When the ship's computer told him he had Shifted in good health, Rhys went immediately to the nearest viewport. Danetta had not exaggerated the situation on Velvet. The planet was literally under siege by what appeared to be four massed wings of large, graceful spacecraft. He knew a moment of anxiety lest the *Campion*'s arrival be taken for a hostile act, but the siege forces vacated a corridor, allowing a shuttle from the Human craft to make its way along a gravitic landing beam to the planet's surface.

Danetta Price had told Rhys enough about the situation on Velvet to worry him and pique his interest. She had warned him about the OROM threat (which would have once been referred to as an "alien menace"), but she had not warned him that Velvet itself would all but assault his senses when he stepped from the bottom of the shuttle's lev-tube.

"Good-God-Almighty," murmured Rick Halfax inadequately. He blinked at the verdant landscape, boggling at the sheer audacity of the colors that stared back at him.

"Well, at least we needn't have any questions about how the planet got its name," Rhys commented. "Ah, and here's our welcoming committee." He stepped away from the shuttle as

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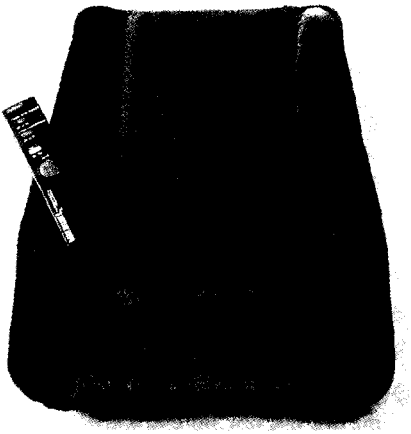

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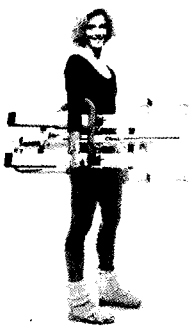

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they were approached by Danetta Price and a tall, distinguished looking fellow with skin the color of French Roast coffee. A natty dresser, too, Rhys noted, and felt a pang of sartorial inferiority. It passed quickly, allowing him to enjoy the other man's bemused greeting.

"Your dress kilt, Rhys—really!" Danetta murmured as they sped toward the government offices in an impressive gravcar. "I am honored. And the overall look is much more . . . understated than I recall."

Joseph Bekwe glanced from her to Rhys with transparent incredulity. How, he surely wondered, could a man in a Tartan kilt with sporran and matching sash and argyles be described as understated?

Rhys chuckled. "Well, a flourescent headdress, I had to allow, was something only the Pa-Kai might appreciate. I did bring my tam, though, in case it's necessary for my head to be covered."

Danetta shook her head. "I think your flowing copper locks will do just fine on this assignment. The Tsong Zee don't affect much in the way of headdress, although from what I've seen the women tend to wear their hair bound and plaited if it's very long."

"The Tsong Zee?" asked Rhys. "That's the other race of men?"

Joseph Bekwe was nodding. "Yes. We have holo-playback of all our interactions with them, a full analysis of their language by the Dynamic Translation System, pics of each individual in the group, everything—I hope—that you'll need to jump into this situation. Danetta speaks highly of your ability to . . . navigate these delicate waters."

"Professor Llewellyn is wonderful," offered Yoshi earnestly. "He did the most amazing work on Pa-Loana. Such a challenge. So much of the communication was performed with minute facial signals and body language and even clothing that—well, it was an inspiration to me, personally." She stopped, aware that everyone was staring at her.

Rhys patted the girl's shoulder and smiled affably. "My public relations manager. Tell me about the OROM language. Danetta mentioned in her packet that it has some grammatical patterns in common with English."

Joseph Bekwe nodded. "Yes. That is, it seems to. But when we engage in any complex communications with them we get lost. The words we're saying are the right words—according to the DT—but they don't seem to illicit the responses we expect. It's as if we're being randomly misunderstood. As for our understanding *them*, well, right now it seems hopeless. They use words we think we know in a context that makes no sense whatsoever. For example, there's this word 'tsri-al' that seems to mean 'Leader' or 'Speaker.' They use it to refer to themselves, yet when they're trying to describe why they allegedly left Velvet, the word turns up in a context that indicates an opposite meaning."

"Opposite?"

"Yes. Just as 'angel' and 'devil' are opposites. In fact, in its alternate context that's just about what 'tsri-al'

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seems to mean, 'devil' or . . . 'liar' or—" He shrugged. "I don't know."

Rhys nodded, his mind already whirling with possibilities. A challenge, indeed. "First off, I'll want to see the holo-playbacks. Especially of exchanges you feel are particularly muddled or difficult. Then . . . we shall see what we shall see."

The Tsong Zee were beautiful—or so Rhys Llewellyn thought. That not everyone shared his opinion was obvious from the antipathy displayed by a few members of the governor's staff during their screening of the playback. He made a mental note to request that those individuals be dismissed from further negotiations and concentrated on the OROM physiology.

They were basically humanoid in form—possessing an upright bipedal stance, bilateral symmetry—enough human characteristics in form and face, Rhys thought, to make humans think they could be easily communicated with. It was an easy mistake to make.

Rhys did not concern himself with the obvious differences in musculature, nor did he stop to wonder how many hearts they had. He was immediately taken with their faces.

Faces were of paramount importance when it came to interhuman communication. This was also largely true of the other humanoid races Terran mankind had encountered. Unfortunately, facial languages were often as dissimilar as verbal ones. And these faces. . . .

For one thing they were a black that made Joseph Bekwe look positively pallid. They were a glossy, light-eating black that seemed to carry undertones of blue or violet. The texture of their flesh was smooth, slick, almost wet-looking. That made reading facial expressions extremely difficult—there were no telltale wrinkles or lines except at the very corners of their wide mouths and those were extremely hard to detect.

Below the sculpted dome of the head, which was in most cases topped by a literal mane of pastel hair, there was an expanse of forehead which displayed a delicate supra-orbital ridge, but no eyebrows. Another impediment to human comprehension. The males wore their hair unbound and long; the females wore it cropped or ornately braided.

The Tsong Zee's eyes were easily their most outstanding feature. They were, in all cases, huge, which contributed to the impression that the Tsong Zee were familiar. They had the classic "ET" look, which, growing out of the twentieth-century preoccupation with extraterrestrial visitors, had spawned myriad first contact movies and books.

The eyes of these representatives came in a variety of shades, although gold seemed to predominate—of the eight members of the OROM team, three had gold eyes. The pupils were especially fascinating. They were vertical ellipsoids which behaved much like the pupils in a Terran cat's eyes. A major difference was that the widening and narrowing of the Tsong Zee pupils seemed to be at the voluntary control of the individual. Rhys

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made a mental note to study close-ups of those extraordinary features.

There wasn't much to the Tsong Zee nose. It was a very slightly raised ridge which divided the face, beginning between the eyes and ending in two dainty vertically slit nostrils above the mouth.

Rhys leaned forward, his attention riveted on that important feature. The Tsong Zee mouth was exceptionally mobile. The thin upper lip was bifurcated; what was a human birth defect referred to as a "hare-lip" was possessed by every Tsong Zee in the representative group. The mouths were, without exception, fairly wide and the lower lip was a fleshy pad of lighter skin. The color of the lower lip, Rhys noted, varied from a mauve in one individual to a rosy pink in another. The same color was displayed on the underside of what appeared to be roughly triangular ear-flaps that adorned both sides of each glossy head.

High, patrician cheekbones were common in the group, but not the rule; jaws and chins gave the faces, with their universally possessed widow's peak hairlines, a roughly heart-shaped appearance, but there was enough variance in the group that Rhys could easily distinguish individuals.

He was nodding absently and Governor Bekwe pounced on the gesture of affirmation. "You see something? Do you understand what the problem is?"

Rhys started. "Oh, I doubt you're dealing with a single problem here,

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Governor. These people are just human enough to make you anthropomorphize, just alien enough to make you uncomfortable."

He silently watched the proceedings between Human and Tsong Zee for several more minutes, then asked that the playback be reset to cover the same sequence with close-ups of the various Speakers. He watched that silently too, unaware of the tension tugging the atmosphere around him. Unaware, too, that every eye in the room was locked on his face.

Governor Bekwe caught him nodding again. "What is it?"

"Excuse me?"

"You look like you've found something."

Rhys smiled wryly. "Governor, I've found a lot of things, but I haven't yet solved your communication problem. I see its roots, though, in the simple fact that the Tsong Zee are not Human."

Someone behind Rhys snorted. "You can say that again!"

Rhys gritted his teeth. "Look. I'm not saying they're incomprehensible or inhuman or even alien in the truest sense of the word. All I'm saying is that, regardless of how human they might be at the core, no matter how possessed of the same qualities that we are, those qualities are not necessarily *communicated* in the same way. For example, they very likely feel anger. All right. When a human is angry, he scowls." He suited action to word then pointed at the holo-column, frozen, now, in a timeless tableau—one race of men meeting an-

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other for the first time. "The Tsong Zee face is not built for scowling. The forehead is smooth; no muscles seem to be dedicated to contorting that part of the face. How do you propose to tell if you've angered a Tsong Zee? How do you imagine they interpret a human scowl with nothing to compare it to?"

Joseph Bekwe uttered an exasperated chuff. "What in heaven's name can we do? We can't read facial expressions we don't have. Neither can they."

Rhys looked back to the holo-column. "Just leave me alone with this for a while. Let me see if I can't pick up some pointers. Then we'll try communicating with them again."

The governor nodded. "I guess we really don't have much choice. We have to negotiate with them, Dr. Llewellyn. Leaving this planet now would be almost impossible and the only other alternative they seem to be offering is a military one."

"Which is to say," said Danetta Price, "none at all."

"You are Speaker?" asked the tall Tsong Zee directly across from Rhys. He raised his chin and gazed down at the human through eyes of pale blue. His nostrils flared as if seeking a scent.

"I am." Rhys raised his chin by about the same amount and tried to emulate the direct gaze.

"Then you will comprehend"—a four-fingered hand clenched—"that you must leave what is not yours."

"We comprehend"—Rhys copied the clenching gesture—"that you desire us to leave."

There was a pronounced stiffening of the Tsong Zee delegation and hurried discussion between the four Speakers, accompanied by much head-shaking and gesticulating.

Rhys cursed silently. He had apparently already committed a gaffe and wished he knew what it was. He went back over the sentence he had just uttered. There was no potentially inflammatory adjectives in the phrase, only . . .

The blue-eyed Tsong Zee Speaker, Javar, was facing him again. "We are pure in our desire to reclaim our world," he said, his eyes blazingly wide, his pupils dilating slightly.

Rhys focused. It sounded like a defense—a protestation, as if . . . "We do not doubt the purity of your desire." He gave his opposite the same wide-eyed stare and wished he could make his pupils react as well.

The Speaker gazed at him silently for a moment, then said, "If this is so, why did you suggest our desire was impure?" His eyes were half-hooded now, assessing or . . .

"I am sorry," said Rhys. "I used the wrong word. I meant to say 'desire.' " Eyes open wide. "Not 'desire.' " Eyelids at half-mast.

The Speaker glanced at his fellows, making a peculiar trilling noise with this bifurcated upper lip. A laugh? A sigh? He shifted in his seat and Rhys caught a whiff of some pleasantly spicy perfume that reminded him vividly of shaving and the tingle of icy cologne.

"This is difficult," the Speaker said, and the corners of his mouth pulled downward. "I wish . . ." He paused

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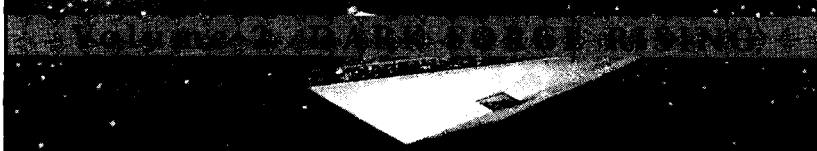

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and made a clearly dismissive gesture with his right hand—a flick-flick of the short, tapered fingers as if he was shooing away a flying pest. "But this is not possible. Let us continue. You now comprehend that our desire for our world is pure. We comprehend that you have conceived a desire (pure) for Tson, as well."

"We are dependent upon it. That is, many of us are. It goes beyond simple desire (pure) for many of us. Some humans have spent the last twenty-five years of their lives on this world. Some humans have known no other world. They love it." He waited. How did love translate to the Tsong Zee? The word, he already knew, was "pree-em-eh." For all he knew, it might also translate as "liking"—the way a Terran would say, "I just *love* onions."

Whatever the translation, he certainly had aroused some reaction among the Tsong Zee. They conferred again, briefly, and the Speaker changed. Now, Rhys was addressed by a delicate person with a musical voice and great, coppery eyes—a female named Parsa.

She sniffed audibly and told him, "You cannot love Tson. You are not Tsong Zee. Only Tsong Zee can love Tson. Our blood rose from its waters. Yours did not. Even those who met bodies here carry in them the blood of another world."

Rhys glanced at the governor, then back to the Tsong Zee. "Your people originated on this planet? That is your claim?"

Copper-eyed Parsa studied him for a moment, then tilted her head to the left. A second later, almost as an afterthought, she said, "Yes. That is our claim." Her chin tilted upward on the last word.

Rhys made further mental notes. "If you are the children of this world, why did you leave it?"

To Rhys's astonishment the entire group of Tsong Zee uttered a beautifully harmonized keening sound, bowing their heads deeply. The spicy scent sharpened.

Rhys waited a moment for the keening to cease, then said, "I did not mean to distress you."

The Tsong Zee raised their gleaming black faces in unison and Parsa deferred to yet another Speaker—a tall, slender male called Brasn whose near-transparent mane of hair fell well past the sashed and girded waist of his bright garment. "You did not distress us. It is our ancestors who have brought us distress. It is through their error that no living Tsong Zee has been born on Tson. I shall sing of this," he said, and closed his eyes.

The other Tsong Zee focused their gazes upon him and began to hum a slow-moving pattern of harmonies that washed over the assemblage in soft waves. Joseph Bekwe opened his mouth to interrupt, but Rhys silenced him with a quick shake of his head.

"Five Tribes," intoned the Speaker. "Tillers of the soil, Walkers of the land, Traders in goods, Searchers of the earth and sky. We, the last, who search the soul and see it. We are the Five Tribes of Tson."

"We are the Five Tribes," intoned the others in harmony.

"Those who till the soil hate those who walk the land."

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Brasn's backing chorus trilled suddenly and Parsa chanted, "They trampled our crops, they tore down our fences, they slaughtered our creatures."

"Those who walked the land hated those who tilled the soil," sang Brasn, and Parsa responded. "We cut their paths, we damned the streams, we planted the land."

"Those who walked the land cried to those who traded in goods," said Brasn.

Now another Tsong Zee joined in—Keere, he was called. "Help us against the Tillers, they cried. Help us and you shall profit by our goods."

"The Traders helped the Walkers of the land."

"We will fight the Tillers," sang Keere. "We must keep open the paths of the land. Such is our trade."

"They fought," intoned Brasn. "They fought while the world turned and land was destroyed and crops died and creatures starved. Then, the Tillers cried to those who search the earth and skies."

Again, Parsa spoke: "Help us against the Walkers and the Traders. Help us and you shall profit by our goods."

"Some Searchers of the earth helped the Tillers of the soil."

The original Speaker, Javar, chanted, "The Searchers of the earth will help the Tillers of the soil. We must have the yield of the land. Of such is our search."

"They fought," keened Brasn. "And while they fought, the Seers of the Soul prayed and the Searchers of the Sky sought their answers, and the world turned and more land was destroyed and more crops died and more creatures starved. Then were people killed."

The whole group, apprentices and all, burst into a trill of wild agitation punctuated with wails of apparent anguish. Irrationally, Rhys found himself thinking about shaving again.

Brasn raised his four-fingered hands and brought them all to silence. "There rose a Speaker"—he lifted his chin—"from among the Seers of the Soul. He warned against the fighting. He exhorted the people to peace. Only the Searchers of the Sky listened, for another Speaker"—his head lowered—"rose among the Searchers and the Tillers and denounced him as evil."

"We killed the Seer!" cried Parsa. "For he spoke against our desires!"

"Now, the Walkers and the Traders looked to the Searchers for one who would deal with them. They found such a one."

It was Javar's turn. "We know of a poison, he said. A terrible poison. It will destroy the Tillers of the soil for it will destroy the soil."

"And the world turned," chanted Brasn.

"We heard the tale of the poison," said Parsa, "and we turned to our Searchers. 'Help us!' we cried. Give to us an equal poison—one that will destroy the Walkers."

"We know of a poison," said Javar, "a terrible poison. It will destroy the Walkers for it will destroy their herds."

"There arose from the Sky Searchers a Speaker (head up)," Brasn narrated. "He warned against the poi-

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sons. He prophesied the ending of the world of Tson by plague. He cried for an end to the war. He cried to the Seers for help. And there arose among the Seers a Tsadrat (word unknown, said the DT) called Kalkt (proper name, said the DT). He exhorted the people to peace before the poison be used. He performed great wonders but, of the people, only the Searchers of the Sky listened—they and some here, some there from among the Tribes. The greatest of the Tribes rose up against him and he went up to the Holy Mountain to hide himself. And the poison was used."

Again, a soul-rending, ululating cry was released from Tsong Zee throats.

"Death!" cried Brasn.

"Death!" echoed the other Speakers, one after the other.

There was a moment of silence, then Brasn spoke again. "On the ruins of our world, those left living gathered. At the foot of the Holy Mountain, Kalkt gathered them and showed them the wonder that the Searchers of the Sky had wrought for them."

"Here are ships," cried Javar. "Here are five great ships to take this people to another world which we have chosen for you. A ship for each Tribe."

"Must we leave?" cried Parsa.

"May we never return?" asked Keere.

"Then spoke the Tsadrat, Kalkt," continued Brasn. "He told the people that before they could return, Tson must be purged of its poisons. And, as Tson was purged, so must its people be purified of their prejudices and hatreds. Only when they could work together as a people would they be allowed to return to Tson. And he gave each Tribe a Key to the Most Sacred Shrine which is in the heart of the Heart of the world of men. And he told them, 'Only when these Keys are used together will the Shrine which is in the heart of the Heart of the world open. And only when that Shrine is opened by your unified effort will you be worthy to return to your world.' "

"We entered our ships," said Parsa.

"We pierced the sky," crooned Keere.

"We found homes on a new world," said Javar. "And we waited and learned to work together and watched our birth-world purify itself from our poisons. And the Great Day came when Tson was pure once again."

"As we are pure of hatred," added Brasn, nodding rhythmically. "As we are pure."

The background humming ceased and Javar, his shockingly blue eyes focused directly on Rhys, said, "But we come home only to find that another people has taken our world. We have waited ages for this Great Day. This is our world, not yours. You must leave."

Rhys tapped off his trans-collar and turned to Governor Bekwe with a bemused frown. "Well, Governor, what do we do now?"

"What do you mean? Good God, we talk them out of this!"

Rhys studied the other man for a moment, then turned to Javar. "If you will excuse us," he said, "we must consult about what you have just told us."

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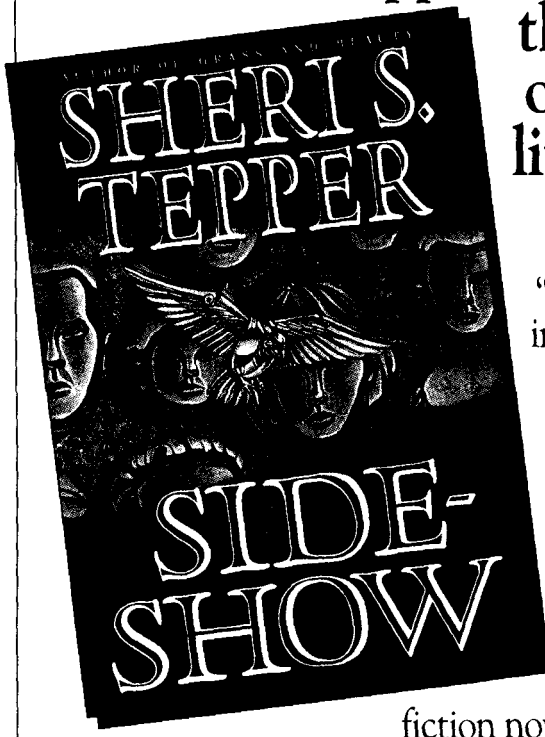

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Javar tilted his head. "Yes," he said.

Rhys rose and herded the governor and his lieutenant out of the chamber.

"What do you mean, 'We talk them out of it?' " he asked when they were out of Tsong Zee earshot. "Governor, that epic they just recited has all the markings of a long-standing Tribal tradition—a compression of centuries into sung verse."

The governor was visibly disturbed. "Then you're entertaining the idea that this . . . epic, as you called it, is a true story—that this really is their home planet?"

"Haven't you entertained that idea yourself?"

Bekwe glanced at his lieutenant, Alleen Goodyear, and shared a grimace with her. "No, Dr. Llewellyn, we haven't, because the archaeological data doesn't support the idea."

"Archaeological data has been known to mislead," observed Rhys. "Tell me, Governor, what if their story is true? What if Velvet really is their homeworld?"

Both the governor and his lieutenant paled visibly.

"We can't leave," said Alleen Goodyear. "How can we? Every man, woman, and child on this planet has invested way too much to pack up now. My God, Professor, there's a whole *culture* here! And even if it is their homeworld, they *abandoned* it. They didn't even leave an OCCUPIED sign or-or a monolith or *anything*."

"At least not anything we've seen," corrected Governor Bekwe. "They did speak of a Shrine as if they expected it would be here when they returned. It's conceivable the Collective would take that as an OCCUPIED sign."

Alleen grimaced. "With their fleet hovering over our heads, does it even matter?"

Bekwe shook his head. "Possibly not, although, to hear them talk, they've abandoned the warlike behavior that got them into this situation. Look, the first thing we've got to do is establish the truth of their claim. If they can prove this is their homeworld, Collective Law stipulates we must negotiate an agreeable treaty for its use or leave without contest. That might be an attractive enough idea to them that they'd spend some time in the proving."

"Buying time for what?" asked Rhys, frowning.

"Buying time to get our own military here," said Goodyear emphatically.

The governor shook his head. "How, Ally? They've jammed every communication since they arrived here except for Danetta's message to Dr. Llewellyn. We're cut off."

"But eventually, that's bound to attract someone's attention."

"Yes, eventually. But not today, not tomorrow. Maybe not even next week. And with the massed power they've got hanging over us, they could just take us by force at any time."

"Which they haven't done yet," Rhys reminded him. "And that leads me to believe *they* believe they're within their rights. After all, if they can force us off the planet, why invent a bogus history? Why rehearse it so well?"

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"I can think of a couple of good reasons," said Alleen. "They may simply want to avoid a military confrontation with the Collective. Or they may not want the surface of the planet polluted. Maybe that's what happened last time. Maybe they really are responsible for the mass poisoning. Maybe they wanted the planet and exterminated the people living here to get it. Now they're back. They find the planet is inhabited again, but they don't want to repeat their mistake and have to wait another two thousand years to take possession. So this time they negotiate."

It was a horrific idea, that one race might callously wipe another from the face of a world merely to possess it, but Rhys had to grant it a certain hideous logic. He literally shook himself to sweep the chill from his spine. "I want to talk to them some more," he told Governor Bekwe. "Are you game?" He gestured at the council chamber where the Tsong Zee waited.

Bekwe was nodding when the comlink chimed. It was his secretary, looking harried and nervous as she peered at them from the holocolumn.

"Sir, there's a colonial delegation here"—she glanced fleetingly to one side—"headed by Mr. Beneton. They say they won't leave until you see them."

Bekwe seemed relieved to be called away even to what was an apparently onerous task. "Do you mind handling this . . . ?" He gestured toward the council chamber.

"Not at all. I'd like to involve my assistants, if I may."

Bekwe nodded and disappeared through the door of the anteroom.

"I'd like to sit in, too, if you don't mind," said Lieutenant Governor Goodyear.

The look she gave him did not exactly set up Rhys's hackles, but it did little to inspire camaraderie. She didn't trust him, and her eyes said so. He nodded, and called out to collect his entourage.

—3—

"We have no wish to usurp the rights of another race of men." Rhys gazed around the circle of black, gleaming faces. "But how are we to believe what you have said?"

"We are here," said Keere.

Rhys spread his hands in a human gesture of bemusement. "So are we. To all appearances we arrived first. Have you any better claim?"

"We sang for you The Leaving," said Keere.

"It was a tragic story. But it is not proof that Velvet is your homeworld. Our archaeologists—our Searchers of History—have found no evidence that a race such as yours ever lived upon this planet. We believe there was a city here and some small settlements, but we find no evidence of a technology capable of sending a people to the stars."

"We did not go to the stars," argued Keere. "We went to the outer planet."

Yoshi Umeki, who had been listening raptly at Rhys's side, stirred restively. "Pardon me, sir," she whispered, "but according to the system

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surveys, the outer planet is a chilly ball of rock barely able to support life. There is no one there."

Rhys pursed his lips. "My . . . apprentice tells me the outer planet is not hospitable to our variety of life. Yet you say you have been there for two thousand years?"

The Tsong Zee held a rapid-fire consultation and Javar took over the Speaking duties. "It would be more proper to say that we have lived two thousand years of our collective existence upon the outer planet, but we . . . we have not lived there for the *last* two thousand years . . . precisely."

"You mystify me," Rhys told him, making an eye-covering gesture he had seen the Tsong Zee use to indicate a lack of clarity.

"There was a time when our star burned much hotter. We selected a portion of that period for our exile. The outer planet is . . . was quite temperate." His wide mouth quirked into what Rhys could only believe was a smile.

"Time travel!" marveled Rick Halfax from Rhys's opposite side.

Rhys waved him down. "You are living in the past of the outer planet?"

The Tsong Zee canted his head in the affirmative.

Rhys made a grand gesture of bewilderment. "Yet another great claim!" At the last second he remembered to widen his eyes. "You ask us to believe so much when there is so little evidence. You ask us to believe you now live on a planet that shows no sign of sustaining humanoid life, and that you once lived on a planet that shows no sign of supporting a spacefaring technology. Can you prove either claim?" He kept his widened eyes locked with Javar's.

"If need be, we can transport a delegation of Humans to Exile. You will be able to see our world."

Rhys tilted his head. "But how are we to know that it is the same planet which now treads the frigid path beyond this one? And to believe that this world harbored your race. . . ."

"When we left Tson," said Javar, "all Tribes but for the Gondavar—the Searchers of the Earth and Sky—went on before. We stayed and obliterated all signs of the technology that had provided fuel for our downfall. We razed the cities and the centers of learning—all but the smallest, poorest settlements were destroyed utterly. We wanted this world to be pure—pure as the day our fathers and mothers crawled from the streams and lakes onto the land. Do you understand this?"

Rhys did understand. And yet . . . and yet Javar and his companions were calling on their human counterparts to believe the incredible. He frowned slightly, tugging at his lower lip. *Why* were they calling on that belief?

"I understand," Rhys said carefully. "What I do not understand is why you do not simply force us from the face of this world. Your fleet is immense. Your weapons are powerful. Yet, you hesitate to use the force they represent."

Brasn spoke then. "We have spent two millennia appreciating the results using of force, Speaker Rhys. And even though the weapons we

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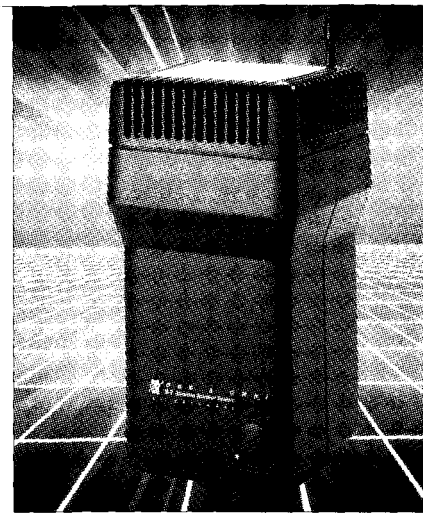

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now use are . . . clean,"—he said the word with what struck Rhys as sarcasm—"they are to be used as a last resort, only. We would prefer to convince you that our claim on this world is just. We understand that what we ask is difficult—"

"It's *impossible*," muttered Alleen Goodyear.

Speaker Brasn afforded her a swift glance. "Still," he concluded, "we must ask it. This is our world. You have many. Your technology carries you vast distances in space. Ours carries us effectively only through time. We are bound to this system."

"But you have a planet at your disposal," argued the lieutenant governor. "You must have ages to go before Bronte begins to cool."

Brasn fixed the human woman with an intense gaze (Rhys doubted the Tsong Zee possessed any other kind). His thin nostrils rippled slightly and his lower lip protruded as if pursed in thought. "Have you ever seen a world like this one, Administrator Alleen?"

The woman actually bit her lip. "I barely remember, Speaker Brasn. My family moved here when I was nine. This is my home. I don't want to leave it."

A chorus of soft murmurs and sniffs rose from the Tsong Zee.

"Then you understand why we wish to reclaim it," said Brasn.

"Yes, but what you ask is impossible. Surely we can share this world."

"No!" Keere very nearly jumped to his feet—would have, if Parsa had not reached out to stop him. "What *you* ask is impossible. We cannot share Tson. Tson is sacred!" He fell silent, quivering with the unspoken.

Yes, thought Rhys, *and you believe we would defile it.*

"The world we call Exile is not like this world," Brasn continued ignoring Keere's outburst. "There our people subsist. Here we may live. I have never before set foot upon this world. Yet I have seen it every day of my life as it was before The Leaving. We have carried it with us, to remind us of what we sacrificed to our greed."

"Yes, sacrificed," said Alleen. "You gave it up. You left it. We *found* it. We—"

"Please," interrupted Rhys. "If we may return to the matter of proof. How do you propose to prove your existence in the past of the planet you call Exile? How do you propose to prove your claim to this world? Your story of self-destruction is plausible, but I find it hard to credit that your scientists could destroy all trace of a civilization capable of travel through time and space."

Brasn's broad mouth rippled in something like a grimace. He palmed off his translator and said something to Javar that to Rhys's ears—already adjusting to the Tsong Zee tongue—sounded like, "It seems you did your job too well, Searcher-of-the Sky."

He turned back to Rhys with a palms-up gesture of conciliation. "There is the White Shrine. If we could find the Shrine and open it, would that not prove what we say?"

"The White Shrine?" Rhys tilted his head left then right. "Yes, I recall you spoke of such a place. But your words surprise me. You say *if* you could find

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it. You have not already done this?"

The Tsong Zee exchanged glances. "No," said Brasn. "We have not."

"And may I know why this is?"

Again, glances flew between bright pastel eyes. Brasn actually sighed. "We . . . have lost one of the Keys."

"*Lost* one of the Keys?" Danetta was incredulous. "You're joking," she said, then waved her hand disparagingly. "No, no—forget I said that. You wouldn't joke about something like this. How the hell could people with that strong an imperative *lose* something as important as the Key to repossessing their homeworld?"

Rhys ran long fingers through his thick thatch of wavy copper hair. "Well, it's a bit incredible, actually—"

"What have they told us that *isn't* incredible?" asked Alleen Goodyear caustically.

Joseph Bekwe waved her down. "Did they show you these Keys? Are they any kind of indicator? If the materials were native to Velvet—"

Rhys was shaking his head and waving his hands all at once. "It's not that simple, Governor. The Keys aren't *things*."

"Not things? What does that mean? What the hell are they?"

"Oh dear," murmured Rhys, rubbing the back of his neck. "This isn't easy to explain. The Keys are . . . sensory devices—aural, tactile, visual—em—savory, aromatic."

"What?" The governor's eyes begged him to be joking.

"The—em—Avatar or whatever he was, Kalkt, gave each Tribe a sensory Key. One Tribe has a snatch of song and sound, another a particular fragrance, the third a taste and so on. Together they form keys to a racial memory of the Sacred Shrine—oh, the way a sudden fragrance or a bit of song reminds you strongly of something you did, someone you were with, or a time in your life. We've all experienced that. Well, to the Tsong Zee these sensory cues are much more tangible than they are to us. Which, by the way, is one of the reasons you were having so much trouble initially with Tsuru."

"With—?"

"Their language—Tsuru. It's made up to a great extent of visual cues, inflections . . . in fact, I believe they even recognize scent messages."

Yoshi was nodding emphatically. "The sniffing," she said. "I caught them sniffing as if they could divine what you meant by the odor of your words."

Rhys pointed his finger at her. "Right. And I don't know if anyone else noticed it, but they were all wearing the same perfume."

"I noticed, sir," murmured Yoshi.

"But why?" asked Danetta. "Why would they wear a uniform scent?"

"Maybe it's exactly that—part of their uniform. Or maybe it's a negotiating tactic. To quite literally throw us off their scent. Maybe they don't want to give away individual emotions, express individual viewpoints. They want, rather, to express the view of the group. Perhaps having a roomful of Tsong Zee all exuding personal thoughts as scent would be the equivalent of us going in there and jabbering away all at once."

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"The Keys?" prompted Governor Bekwe.

"According to Brasn, when the planet was purged the Speakers of the Five Tribes were to share their Keys. The collective Keys would lead them to this White Shrine. The problem is, the visual Key has been lost."

"The Tribe forgot it?"

Rhys shook his head. "Didn't you notice, Governor, that when they told us the epic, Parsa—who is a Tiller by descent—chanted on behalf of the Walkers, telling the Walker part of the story from the Tiller viewpoint? Keere, a Trader, did the same thing when his Tribe's interaction with the Walkers came up. That's because there are no more Walkers. Their ship failed to make it through the time shift. And they had the visual Key."

"Puzzle with a piece missing," murmured Danetta.

"Do you believe them?" asked Joseph Bekwe.

"Yes, dammit, he does!" Alleen Goodyear made no attempt to hide her distrust. "Admit it, Doctor. You *like* them."

Rhys took a deep breath and felt for the small, leather Pa-Kai fetish pouch on its silken thong. *Patience.* "Yes, I like them. They're a likable lot."

"But their story is incredible!" Bekwe argued. "With temporal technology that would send them backward millions of years, why didn't they simply jump *forward* into Velvet's purified future?"

"They didn't have the skills necessary. Nor did they have the capacity to work together. They had their own purging to accomplish—prejudices, hatreds, mutual distrust. According to Brasn, they had to acquire the wisdom and discipline necessary to use the Keys. They viewed it as their part of a covenant with Kalkt."

"Hooey," said Alleen. "And you fell for it. It was penitent nonsense, Joseph, really. I don't believe for one moment that they've been living in the past, doing penance for their sins and learning to behave like good little aliens. Nobody exiles themselves to a ball of cold rock just so they can learn the error of their ways."

"No *Human*, you mean," said Rhys. "You're judging them by Human standards—or, well, Terran ones, at any rate. And I don't even think you're right about that. Human history is full of individuals who voluntarily did penance, as you put it. But as to the proving of it—they offered to transport us back for a tour of Exile."

Danetta stared at him. "Rhys, you aren't seriously considering getting aboard one of those ships!"

"Actually, I'd love to get aboard one of those ships, but what would be the point? We'd have no way of being certain that what they showed us was actually that planet out there." He jabbed his finger at the ceiling. "Besides which, what they've shown us of their technology is enough to make any sane person suspect they may have even more wonders up their colorful sleeves."

"But you believe them anyway," pressed Danetta.

Rhys's gaze touched hers obliquely on its way to the window. "Well, they're supposedly going to show me

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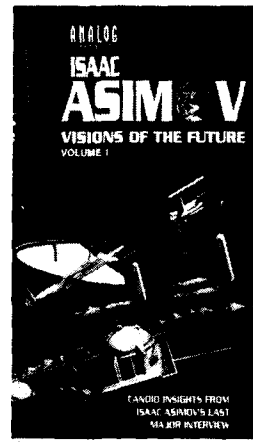

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something by way of evidence at our next session."

Bekwe sighed explosively. "We need to get a message to the Collective before this situation gets completely out of hand. There's already one group agitating for a military response. A surprise attack. They find the idea of us negotiating with the Tsong Zee extremely repugnant and are of the firm if uninformed opinion that anyone with that much firepower can't possibly mean well. They're psyching themselves up for a battle."

"Better dead than Red," murmured Rhys.

"What?"

"A very old nationalistic watchword. It expresses the idea that it's better to die fighting than to live under alien fiat."

"Well, isn't it?" asked Goodyear.

"The Tsong Zee aren't trying to enslave us, Ms. Goodyear," Rhys observed. "If their story is true, they are asking us to liberate their planet . . . to liberate them."

Bekwe shook his head. "How can we? Even if they did find this Shrine of theirs, how can we just pack up and leave?"

Rhys gestured his two assistants to his side. "We'll need to establish a headquarters, Governor. We'll need access to the Dynamic Translator and your computer system—complete library access."

"Of course. Our resources are at your disposal."

Rhys moved closer to the transparent outer wall of the office, affording Velvet's scenery what was probably only the second notice he'd given it since arriving. *Stunning*, he thought. *Bloody stunning*. It made him think almost painfully of Scotland in early summer.

Movement on the plaza below pulled his attention down from the outlying mountains. A crowd had gathered there to mill and chatter, while above them, on the edge of an ornamental planter, a man paced and gestured, turning to address them, pausing to tease them. He had their attention now, and drew their fear into his hands where he could massage it, amplify it, direct it.

"How dangerous is this citizens' group, Governor?" Rhys asked, his eyes not leaving the square.

"Dangerous? To whom?"

"To themselves, to all of you." He turned back to the group in the office. "Who pushes the buttons, Governor? Who aims the lasers? Could this lot get access to them?"

"I like to think not. But they're fronted by some fairly powerful businessmen and, in case you hadn't noticed, Velvet is almost all business."

Rhys's eyes went back to the window. "The Traders versus the Searchers, this time, then," he murmured.

"Funny you should put it that way," said Governor Bekwe with nothing like humor, "because Harris Beneton wants to meet with you."

"Wonderful," Danetta said, and looked anything but pleased.

Rhys's eyebrows ascended. "Should I know this name?"

Danetta shook her head. "No, but I do. I had a brief altercation with him during some business negotiations

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the other day. A singularly stubborn individual who seemed to be very much aware of his own worth—in dollars and cents, at any rate. By the end of the first ten minutes, I wanted to call him *Lord* Beneton."

Joseph Bekwe was nodding vigorously, a smile tugging up the corners of his mouth. "I've never heard a more accurate description of the man. I met with him and a group of his associates earlier today. Harris Beneton is the head of BeneCon Enterprises, a growing consortium of businesses that now have major interests in Velvet's vast array of resources. This situation is extremely unsettling to him—to put it mildly. Mr. Beneton will lose an empire if the Tsong Zee force us to leave Velvet. Even if we were to come to some sort of terms—I told him we'd try to negotiate, at any rate—well, let's just say he's not inclined to share. He and his associates are of the firm opinion that a military strategy is the *only* one we should be discussing."

"May I ask," Rhys asked, "how Mr. Beneton came to find out that the Tsong Zee were claiming Velvet?"

Joseph Bekwe's face suffused with sudden color. "He claims he figured it out himself—scuttlebutt from incoming merchanters and, of course, the big aerial display they put on. He . . . told me what he thought was happening—that we were being invaded—and demanded to know if his enterprises were at risk. I really didn't see an advantage to being evasive. He'd already jumped face first into a worse-case scenario—one I had no intention of letting him spread all over Haifa. The true situation, as I knew it at the time, was a long step back from the brink."

"And why," asked Rhys, "does he want to talk to me?"

"I explained that we had an expert dealing with the situation. He demanded to know what kind of expert, so I told him you were an anthropologist, xenologist, linguist, and a top negotiator for the Tanaka Corporation."

"Ah. And did that impress him suitably?"

"It did not. He wants to make sure you understand the situation from the viewpoint of Velvet business concerns."

"Sir, is this where someone measures you for concrete galoshes?"

Everyone in the room turned to stare at Yoshi, whose face, despite the sheer absurdity of what she'd said, was completely and ingenuously solemn.

Quailing under the sudden scrutiny, she took a step in retreat and unnecessarily batted a wing of glossy black hair away from her cheek. "I'm sorry, sir. I was just reading a history of twentieth century mega-business and . . . well, you know, sir . . . the 'big Boss?' 'The Man?' Concrete galoshes were used to make recalcitrant associates appreciate corporate policy. Although, sometimes they got . . . 'iced' . . . 'chilled.' " Her voice trailed away miserably. "Excuse me, sir. I must have misunderstood the situation."

"I'm not so sure, young lady," said Joseph Bekwe candidly. "Beneton and his cronies are . . . the sort of businessmen you're not terribly

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pleased to see in a new colony. I'm not sure ruthless is the right word for them, but they are singularly purposeful in their undertakings. There were a lot more small, independent business in Haifa before BeneCon came into being."

"But they've never done anything illegal?" Rhys asked.

"Not that I know of. At least, I've never had any official complaints. But you'll want to be careful with him. Tactful. The last thing we need right now is someone of Beneton's stature encouraging the sort of thing that's happening in our courtyard."

"What's the official stance in the media? What are you telling your colonists?"

"That we have visitors. That they are in no danger. That the situation is being dealt with."

Rhys nodded. "I suppose that's about all you can say under the circumstances. It'd do no good at all to tell them they may have to start packing . . . or fighting."

Bekwe started uneasily. "Do you think that's a possibility?"

"My dear Governor, anything's possible. Conventional wisdom would suggest we expect the best and prepare for the worst."

Harris Beneton was not what Rhys expected. He was a young man—of an age with Rhys—which indicated he was either formidable or fortunate or both. He had a quiet, sober manner and eyes that missed nothing.

"You're the expert negotiator?" he asked, shaking Rhys's hand. It was not so much a question as an expression of incredulity Rhys was obliged not to react to.

"That's what they tell me," he returned agreeably. "And you're the head of a consortium. I'm told you wanted to discuss something with me. I can't imagine what."

Danetta, already seated with the governor at the oval table in his private conference room, quickly suggested the two men take their places. Once they had, Beneton came directly to the point.

"I do have something to discuss with you, Dr. Llewellyn. My consortium has a major interest in Velvet. In fact, Velvet is its only interest. BeneCon is not part of some off-world conglomerate, so our destiny is rather more tied to the survival of this colony than say . . . Tanaka's. If you are to be negotiating for this entire colony, I want to be assured that you're not going to bargain it out of existence."

Rhys smiled. "And you think that's something I can guarantee? That's raw flattery, Mr. Beneton."

"No, I don't think you can guarantee it. That's why I stand behind a military solution to this problem. I want you to make the Orcas understand that if they aren't willing to leave peacefully, military intervention will become necessary."

"Orcas?"

Beneton smiled briefly. "A term I coined. Accurate, don't you think? I find their skin reminiscent of a killer whale's." His eyes added that he thought he was extremely clever.

Rhys let the racial slur pass and pursued the more relevant theme. "I

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can't make the Tsong Zee understand something I don't appreciate myself. Governor Bekwe has mentioned military action as a defensive last recourse and then, only if the Tsong Zee resort to violence themselves. We are conducting negotiations—"

"Negotiations? They come in here all but flying the Jolly Roger, and you want to negotiate? What's to negotiate? They're clearly the aggressors. We've no choice but to call in the Collective."

"They may have a viable claim. A reasonable approach—"

"They can't possibly have a viable claim. The extinct natives of Velvet were not a spacefaring race. That's common knowledge, Dr. Llewellyn. I can only assume that your being new to the situation—"

"Mr. Beneton, I am an anthropologist. I have been over the archaeological data and I thoroughly understand them. One of the first things an archaeologist learns is that unless it's written in stone, nothing is written in stone. Your people here have been dealing in theories and hypotheses built upon a foundation of fragmentary physical evidence. It is possible, if not probable, that the Tsong Zee have a claim to Velvet. And we have to investigate that possibility."

"They have no claim," Beneton repeated. "And when that's proven, do you honestly think they're going to just pack up and go away? You're supposed to be a negotiator. Can't you smell a bluff when it's waved under your nose? They were hoping to scare us off. When that fails, they'll fight. We have to be ready for that. In fact, I think we ought to attack first."

"With what?" asked Governor Bekwe. "Our military capacity here isn't equal to blowing four wings of armed ships out of orbit. Especially when those ships are armed with a damping field like the one they demonstrated the other night."

"I say we try to get word out to Collective Security."

"And how do you suggest we do that? They let one message out by TAS packet—the one that summoned Dr. Llewellyn. And if we could call for military aid, how is the Collective supposed to field a force daunting enough to scare the Tsong Zee off?"

"I wasn't thinking so much of scaring them off as engaging them."

"And turn this planet into a battleground again?" asked Danetta. "It lay fallow for two thousand years after the last holocaust."

Beneton shrugged. "That needn't happen. Weapons are cleaner now."

Rhys shook his head. "Oddly enough, that's what the Tsong Zee said, too, but they still don't want to use them. Why force their hand? They've shown us one non-injurious weapon of defense. Do you really want to see what else they've got in their arsenal?"

Beneton shifted uneasily in his seat.

"If we could attack the Tsong Zee," Rhys persisted, "it's entirely possible that a retaliation from them could mean the end of Haifa and her satellite communities. I'd say that would effectively destroy your consortium's interests, wouldn't you?"

For the first time, Beneton displayed some emotion. His face red-

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dened, making his pale eyes stand out with gimlet keenness. "To fight for something and lose it is acceptable to me, Professor. To sit by and let some alien snatch it away without so much as a snarl is not."

Governor Bekwe stood, bringing the meeting to an abrupt end. "Dr. Llewellyn has more important things to do with his time than circumambulate this issue with you. You are a leader of business, Beneton, *not* of government—which is a great blessing for this colony. You may find it acceptable to fight and lose; I do not. If it were a matter of property I might agree with you. But it's not. It's a matter of lives. Lives that have nothing to do with you and your consortium. You've met Dr. Llewellyn; you've asserted your viewpoint. That's all I agreed to. As governor of this colony I am going to *request* that you engage in no actions that will undermine our negotiations with the Tsong Zee."

Beneton's lip curled. "Request?"

"Let me put it this way. Seditious behavior will result in immediate internment. Do you understand?"

Beneton stood. "Clearly and completely. I'll comply with your request, Governor. But I can only promise my own, personal cooperation. Do *you* understand?"

"Good day, Mr. Beneton." Joseph Bekwe aimed a pointed gesture at the door.

Beneton uttered a curt response and left.

The governor breathed out an invective and turned to Rhys. "Any questions?"

"One. How does he know what the Tsong Zee look like?"

Bekwe's mouth twisted into a grimace. "There's only one way he could know. Someone on my staff must have shown him."

—4—

With the next negotiating session set for the morning, Rhys, Yoshi, and Rick spent the evening with the colony computer system, collecting and organizing the now vast databank of Tsuru words, phrases, expressions, gestures and incidental noises into their own version of a SubLearn language course. They slept that night with the sights and sounds of the Tsong Zee playing methodically in their dreams. By morning they were able to dispense with their trans-collars. This caused quite a stir among the Tsong Zee who met them in the council chamber.

"You have learned our language in the space of a night?" marveled Javar, his blue eyes amplifying their usual startled expression. "How have you done this?"

"With the aid of a special computer," Rhys explained carefully in Tsuru, "we have learned in our sleep."

"And *why* have you done it?" asked Keere. His stiff posture and up-tilted vocal tone broadcast suspicion.

"To better understand you. To eliminate as many barriers between us as possible.... Now, I would like to ask you a question."

When Keere indicated this was acceptable, Rhys continued, "I have given much thought to what you told us yesterday about your reasons for

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not traveling to the future of this planet. They seem to be sound reasons to me, if not to others of my kind. But what I do not understand is why you chose this particular time to arrive here. Why not twenty-five years ago, or thirty—before humans even set foot on this planet?"

Keere and Javar looked at each other, pupils dilating and contracting, and Rhys fancied he caught a whiff of some aroma beyond their careful uniform scent.

"We did not choose," Javar told him. "The time was set by Kalkt and the Gondavar—the scientists. They measured the time it would take for the poison to fade; that was the time set on The Waiting. When The Waiting was complete, we returned."

"But even now," argued Rhys, "could you not go back to before humans set foot here and reestablish yourselves? Then when we discover the planet—here you would be, already."

Keere glanced at his companion and shifted from one foot to the other in what Rhys read as a gesture of unease. An odor like wet leaves curled in his nostrils.

Javar's mouth pulled down sharply at the corners. "Our technology does not allow us to make such . . . brief jumps. Time, to us, is a corridor with two doors. One door opens into Exile's past, one into Tson's present. There are no other doors."

No other doors. That put severe limitations on Tsong Zee temporal technology.

"Why?" he asked Javar. "You're a scientist. Have you not attempted to open other doors?"

The Tsong Zee's mouth pulled up at its extreme corners. "We had more pressing concerns. The technology we developed is geared to a specific purpose. The Tribes have grown in the past two thousand years. We must have a reliable way to transport them homeward. That was our purpose and we have fulfilled it in this . . . fleet of ships."

"The implications of what you've just told me are that time is not completely relative within your two-door corridor."

"That is correct, Speaker Rhys," said Javar. "When we travel to Exile time elapses at the same rate at one end of the corridor as it does at the other. If we were, as we previously suggested, to transport you and your assistants to Exile, we would be gone for whatever amount of time it took to reach Exile for the time-jump back, visit the planet and reposition the ship in orbit around Tson for the jump to the present. The ends of the corridor are not fixed—they slide—but its length, its duration, is set."

"Then the entire transition would take hours—days even."

Javar canted his head. "As you see, taking you to Exile is highly impractical as well as pointless."

Rhys held out his hands, palms up. "What then? You said you had evidence to offer. . . ."

Javar signaled his apprentice, who carried to him a satchel of soft, verdant material. From it, he lifted a sense-cube of almost blinding azure. "This artifact," he said, "is from the

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world of Exile. We are aware that you have found similar things here on Tson. That is no surprise to us, of course, for the technology originated here with our ancestors. Compare this to what your scientists have found. Perhaps it may stand as some form of proof."

He handed the sense-cube to Rhys, who set it on his lap, brow furrowed. After a moment of hesitation, he placed his fingertips against the block's shifting surface.

"Forevermore!" Rhys ogled at the cube, then shot his assistants a brilliant, if tentative smile. "This is fantastic!"

It *was* fantastic too, for the merest touch told him volumes. Add to that the shifting, shimmering, transient flow of color and texture and he suddenly knew the name of the star and the names of each of its planets. There was mention of distance he could not put into human terms, yet knew to reflect the measurement of the amount of space between the Sun and each of its worlds. He saw the frozen, wind-scoured surface of Exile as it was presently; he saw it as the Tsong Zee knew it—an uncompromisingly bleak ball of muted, sagey greens, siennas, and umbers rolled out beneath a sky of faded aquamarine. Any colors on Exile were found in manmade goods—buildings, ships, vehicles, clothing. Those colors all spoke of Velvet and, in Exile's pigment-starved environment, they stood out in alien relief.

He passed his hands over the surface with a tingling sense of awe; ea-

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ger, now, for the touch of new knowledge, knowing he had been pulled one step closer to belief in the Tsong Zee claim. He could no longer pretend to see in them the Wellsian invaders Beneton so feared.

"Mahor," he said "that's the name of your sun. And the planets are Bruka, Tson, and Kamorg—Exile. The length of a Kamorg year is 498 days." He turned the cube experimentally. "Ah, grand! This is one of the ships that brought you to Kamorg—carried you through space and time." He afforded the watching Tsong Zee a heartfelt smile. But in a moment, his smile faltered and he pulled his hands away, cringing from the multi-sensory legend. He looked to Javar who gazed back intently. "This is the ship that failed. The one that carried the Tribe called Gondatrura—the Walkers."

He tucked his hands under his arms as if he could drive the chill of that knowledge from his fingers. An amazing medium, this, a medium that conveyed emotions as well as images, words, even scents and textures. It made human script seem flaccid and pale, just as Velvet—no, Tson—made Kamorg seem that way.

"Not looking good for the home team, eh, Boss?" Rick Halfax's expression belied the glibness of his murmured words. Rhys sighed. "At this moment, I'm not sure who the home team is."

And that, he had to acknowledge, was not a good thing. Here on Velvet were thousands of humans who had a vested interest in disproving the

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Tsong Zee claim to the planet. Many would be only too willing to believe the OROM capable of incredible deceit. In the worst case, admitting the veracity of their claim could be tantamount to packing the entire human colony into a flight case. At best, it meant sharing a planet both parties had assumed was theirs to keep. But there, on Kamorg, at least according to this history, awaited an even greater number of Tsong Zee, longing to return to their homeworld. Rhys knew a sharp desire to see Human and Tsong Zee sharing its surface—and knew, as he entertained the thought, that he fully believed the Tsong Zee claim.

Or fully wanted to. His fingertips returned to linger over the sepia-tone world of Kamorg and he wondered if the whole thing could be a grand manipulation—a lie. He stirred, pulling himself up from reverie, and handed the cube to Rick Halfax.

Rick licked his lips, twitched his fingers and tentatively fingered the thing, looking for all the world like a nervous safe-cracker. "Wow!" he said after a moment of intense study. "Wow! How far back did you . . . ? Why, it'd have to be millions of years—*billions, even.*" He turned to Rhys. "We haven't been able to extend the Shift range anywhere near that far."

"No, we haven't," said Rhys and wondered how to cement a filial relationship between human and Tsong Zee. The benefits to both races of men in the area of science alone was mind-boggling. Together they could —

He shook himself. Rampant idealism. They weren't together. They were separated by an armed fleet and the desire to be the sole owners of paradise.

"The city that is . . . depicted in the cube—" he began.

"Tsonvar," Javar told him. "Home of Science. The largest of our cities. The center of our efforts."

"It's a very . . . live place. Thousands of people, businesses, places of education. It has roots. It is not the sort of thing that can be simply packed up and moved to another world."

Javar glanced at his fellows. "We are aware that this relocation will not be easy. It must be a gradual thing. Our ships are designed with the transportation of thousands in mind. We are prepared."

"All of you?"

Javar didn't blink. "We are prepared." He nodded at the cube. "Do you think your people will be convinced?"

Rhys smiled ruefully. "I suspect you know it won't be that easy. Whether they believe you belong to Tson, or it belongs to you, they won't be able to just pack up and leave. They've been there for over twenty years now. They feel . . . bound to this world."

"And the Tsong Zee have been on Kamorg for two thousand years. Do you not think that many of us also feel bound? We will still leave. We will still come home."

"How many, Speaker Javar? How many will go home and how many will stay simply because their lives

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are on Kamorg and always have been?"

The Tsong Zee Speaker glanced away. "Some will stay."

"And the Tsong Zee will be split—again. Not just between worlds, but between epochs. That's a hard thing to contemplate."

"But to come home . . ." Javar murmured, and Rhys could not mistake the emotion in his voice.

He leaned toward the Tsong Zee man. "Perhaps Tson is big enough for two races of men to call it home."

Every Tsong Zee in the room expressed some opinion about that—loudly. Javar shook his head, once, in an emphatic gesture of negativity. "No! It would not work. You are not like us. You are different and you cannot deal with us in kind. We hold Tson in reverence. It is in our blood and our blood rises from its streams. You could not possibly understand. Across the centuries, across the miles, Tson's streams pull at the blood of the Tsong Zee. You are right to think that some of us may stay behind on Kamorg, but I assure you, they will not be many. And of those who will come to Tson, most feel as Keere does." He glanced at the younger Tsong Zee Speaker. "We have spent two thousand years coming to terms with our own differences, Speaker Rhys. We cannot be expected to come to terms with an alien race of—"

"Men," said Rhys.

Javar closed his eyes. "You are not Tsong Zee."

End of discussion. Rhys turned the sense-cube in his hands. "We'll have to show this to our scientists."

Javar's eyes opened. "They will find it is the same as the artifacts they have found here," he said. "It differs only in age."

"What'd he mean," asked Rick, when they had adjourned to the office Bekwe had afforded them as a headquarters, "deal with us in kind?"

"I haven't a clue . . . yet." Rhys sighed and handed him the azure sense-cube. "Let's get this to Dr. Kuskov. See if he can tell us anything significant about it."

Rick turned the vivid object over in his hands. "What you were asking Javar about the exodus . . . you seem to be thinking it's going to have a profound effect on their society. More profound than they've anticipated?"

"Possibly."

Yoshi, who had been absorbing everything in silence, suddenly entered the conversation, her expressive face radiating concern. "Think what it might do to their families, their infrastructure, their economy. If there is a complete society on Kamorg, won't the loss of so many people cause it to fragment? What will hold it together? Who will fill in the missing pieces?"

"Yeah, but, Yoshi, how many people really want to go back to the old Motherland? I mean, it's been two thousand years, for God's sake. None of them know Tson by personal experience. They've only read about it in those stones or seen it in museums. How many humans do you know that go to museums with any sort of frequency? How many do you know that really care what Earth looks like or

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develops an incurable urge to return?"

"You have a good point there, Roddy." Rhys told him. "But the situation's completely different. I think we have to look at the historical equivalents. For example, the Jewish nation on Earth. Every time they got ripped away from the land of Israel, they made it back again, sometimes generations later. Many of them left hell to return, but many left behind a paradise. It didn't matter that home was a barren desert, rife with danger and conflict. It had a legendary significance—a prophetic pull that transcended practicality or merely material considerations. We're looking at a pilgrimage, Roddy—an Hejira. You may be right in thinking that some of these folks won't want to migrate back to Tson. But we've no idea how many of them are 'believers' who will do anything to get to the Holy Land. Tson is Mecca; it's Bahji; it's Mount Carmel."

Rick glanced at him, startled. "Ironic, isn't it? That's what the first colonists called that mountain they set down by—Carmel. Almost as if—"

Yoshi was nodding. "Almost as if they sensed it was a Holy Place . . . for someone. Do you think the White Shrine is in one of the mountains in *that chain, sir*?"

"Possibly."

"Only there's no way to find it." Rick held up the cube. "Too bad old Kalkt didn't put his Keys on these."

Rhys shook his head. "Too chancy, that. Those can be lost or destroyed in a million ways. What were the chances, really, of an entire Tribe of people being annihilated like that?"

Rick exhaled loudly. "Kismet?"

"And here we are," Rhys murmured, "another obstacle in their path. Another hindrance—" His brow puckered. Why a hindrance? Why not a help? He shook himself, feeling traitorous. He'd been brought in to help the human colonists and here he was trying to think up ways to aid the Tsong Zee. Was it necessary, he wondered, for those two ends to be mutually exclusive?

"What does the governor intend to do?" George Eising, assistant vice president of the Beneton Group, was nervous. He did his best to hide this from his CEO, but it was difficult. He forced his hands to relax on the padded arms of his chair, but he could not force the perspiration that beaded on his upper lip to ooze back into his pores.

That inconvenient reflex put him in a catch-22: if he wiped the sweat away, he would draw attention to his anxiety, if he did *not* wipe it away, his body would do that for him. You did not let Harris Beneton see fear. He glanced around the table at the faces of the five other board members, wondering how they managed to hide their own anxiety . . . if, indeed, they had any.

Looking across at Vice President Woodrow Carson, he could doubt the man had ever felt anxious in his entire life. The "in" joke on the board was that "Wood" was more a description than a name. Tearing his eyes from the other man's impassive face, Eising put his hand to his mouth and

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pretended to look pensive.

"The governor," said Beneton, "seems content to do nothing. He's made an advisor of that Tanaka witch and some . . . nutter anthropologist named Llewellyn."

"Jesus," murmured Carson, "even his name is offworld."

"Gaelic, actually. Between them, they've got Bekwe spouting philosophy and sitting on his hands. I couldn't make any headway with him at all. They want to negotiate with the Orcas. They'll negotiate away everything we've worked for if we let them, which, of course, we won't."

The two junior members nodded, while Eising rubbed his upper lip, looking thoughtful. "What's our next move?"

"Your next move is to keep doing what you've been doing: apply public pressure to the situation. Give the religious leaders some more to scream about. One little group of fanatics is not enough. There are a lot of people out there with a lot to lose. Find them and organize them. Wood, I want you to get us some more support inside the governor's office. I also want some sort of military option."

"*Military* option?" repeated Eising, losing his studied pensiveness. "What military option? We don't have any weapons."

Wood Carson ignored him. "I'll come up with something."

"I've no doubt," said Beneton. "Meanwhile, I will attempt to do our governor's job for him."

Gedde Kuskov shook his head, his eyes still glued to the stream of data playing across his handcomp's small monitor. "Similar . . . in fact, almost identical in terms of the molecular structure of the coating medium. But the core material is substantially different. Is this alleged to have originated on—what was it—Kamorg?"

"Yes." Rhys started to cant his head, then caught himself and nodded. "Javar said this was created on Kamorg as a-a sort of history lesson. According to him, every man, woman and child on Kamorg has one something like it."

"That would explain the differences. It's much more recent than anything we've found here." He glanced back at the computer display. "About, oh, twenty to thirty years old. Fascinating." He broke off to hum tunelessly over the computer's continuing readout, then put the machine down and picked up the sensecube again. "It's much more detailed, much less . . . emotive. The artifacts we found on Velvet are quite primitive by comparison. I suppose that just could be a loss of detail due to age and weathering. That might explain the drabber colors in our finds here. We could subject this one to some extreme physical stresses and see if it loses definition."

Rhys sighed. "If only we had a picture of the people who created these old tiles. They're pretty clearly depicted in this,"—he pointed at the cube balanced on Kuskov's palm—"but your artifacts—"

Kuskov was shaking his head. "Nary a clue," he said, then frowned. "Unless . . ."

"What?" asked Rhys.

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Kuskov moved to a nearby shelf and reached down for a plastic container. Out of it he took a shard of near-black sense-tile. "When I 'read' this, I . . . sensed depictions of people in it. I saw human beings. Maybe that was only because *I'm* human. I had no idea what Tsong Zee looked like. . . ."

"Do you think if you did you might have seen Tsong Zee?"

Kuskov was nodding vigorously. "This isn't so much a visual medium as it is an imaginary one. It gives you a set of stimuli and your mind provides the visual imagery—like a book of fiction. If you don't tell readers what color the heroine's skin is, they'll imagine it for themselves. Of course, subtle pointers can be used to steer them in the right direction. Tell them someone has blonde hair or blue eyes and chances are they'll automatically see a light-skinned person."

Rhys reached for the black shard and held it between his two hands, concentrating all his attention on its multi-dimensional contents. Descriptions. There had to be some descriptions. There were. The softness of someone's green eyes, the bright gold of her hair, the glisten of sun on her skin. "She" could be a ringer for Parsa . . . or for Danetta Price. He sighed audibly. "Totally subjective. Totally, totally subjective." He handed the shard back to Kuskov, irrationally despondent.

"That would stand to reason," said the archaeologist, "if the Tsong Zee created this for their own consumption and not for ours."

Joseph Bekwe looked like a man who had just seen a light at the end of a long, dark tunnel. "But Rhys, you just said the descriptions in the azure cube were clearly of Tsong Zee. Wouldn't that indicate that it was made just to impress us?"

Rhys was shaking his head. "I saw Tsong Zee in the cube because I *expected* to see Tsong Zee in the cube. Dr. Kuskov saw humans in the black tile because he lacked another frame of reference."

"He's right," said Kuskov hefting the shard, "the imagery is subjective—I see people. Now that you've shown me Tsong Zee, I realize the subject of the shard could just as easily be them."

"Then this evidence is no evidence at all," Bekwe insisted.

"Now, I wouldn't say that," Rhys objected. "It's the same process. It's from Kamorg. It's virtually new. All of that establishes a connection between the Tsong Zee and Velvet." He looked to Kuskov for support and got it by way of a string of eager nods.

Bekwe pierced him with a keen glance. "Dr. Llewellyn, I am persuaded that the Tsong Zee have found a champion in you. You're actually disappointed that this cube is inconclusive. I suppose you think you're trying to be objective, but it's damned hard on my patience."

"I apologize to your patience, but I'm not trying to be objective. I'm trying to be conciliatory. The cube is inconclusive only in that it doesn't show us pictures of Tsong Zee. But it *does* establish a connection—"

"Which could be spurious. The Tsong Zee might have stolen this

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technology from Velvet's natives for all we know."

"What proof will you accept, then, Governor? What will induce you to tell your colonists that the Tsong Zee have every right to be here? Would you accept their White Shrine as an OCCUPIED sign?"

"*If* they could locate it. But they can't. They've admitted as much. Which, by the way, is highly suspicious."

"Granted. Suspicious, but not damning."

Bekwe made a gesture of frustration. "Dammit, Dr. Llewellyn, I've got to find a solution to this crisis. One that doesn't involve either death and destruction or running away from all we've built here. They abandoned this planet—"

"Planning to return. *Living* to return. And now, here we are, camping out in the middle of their heritage."

"We could share it."

"Aye," agreed Rhys. "Some of us would. And some of us wouldn't. Likewise with them. There are xenophobes on both sides. Speaker Keere and Harris Beneton among them."

"What about the other Tsong Zee?"

"I think Javar is a fairly objective soul. I think if I got him alone, really talked to him man to man, if you will. . . . Ah, well, even if I could convince him we're a fairly peaceful lot, I don't think he's in a position to force his will on the others. All gut feeling, anyway. I've nothing to substantiate it."

"But if even one of them could be made to see reason—"

"It goes deeper than reason, Governor. We're not of Tson. Our 'blood' did not 'rise from its waters.' We're alien to them. Probably the first aliens they've ever come in contact with. They're afraid of us. And I'm not sure they shouldn't be."

Returning to the governor's office, they were met by a crisis situation and an uproar to match. A shrieking rabble milled in the courtyard, forcing the governor's driver to enter the Admin Complex through the underground car park.

Alleen Goodyear met them in the governor's outer office, her face pinched-looking and pale. "They've attacked one of our freighters," she told Bekwe bluntly. "Pulled it right out of the sky and forced it to land."

"What? What freighter? What happened?"

Goodyear's face pinkened slightly. "A-a BeneCon freighter . . . lifted off—"

"On whose permission? I ordered all commercial craft grounded!"

"They-they didn't secure permission. They were trying to get out—to get a message to Collective about this siege." *That was heroic of them,* said her eyes.

"Of all the idiotic—" Bekwe made an exasperated gesture. "Was anyone hurt?"

"Not that I know of. The Tsong Zee snagged it with that beam-net while it was trying to make position for Shift. They almost made it, too," she added.

"Did they get a message off?" asked Danetta. She hovered tensely at Joseph's shoulder.

Alleen Goodyear gave her a steady,

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gimlet look that nearly took the gold enamel off her fingernails. "I don't know. I hope so. Why don't you ask your Orca friends?"

"Alleen, that kind of sarcasm is uncalled for," said Bekwe. "I realize this is a stressful situation. It's stressful for everyone."

Goodyear took a deep breath and nodded. "Yes, you're right, of course. I'm sorry, Joseph. I'll look into the safety of the freighter's crew."

"Thank you. Rhys, I'd appreciate it if you and your associates would speak to the Tsong Zee about this . . . latest development. I have a bone to pick with Harris Beneton."

"We do not know if a message was sent," said Keere. "But this sort of betrayal will not be tolerated." He stood with his shoulder to Rhys, pointedly refusing to look at him. His apprentice echoed the posture, while Brasn and his apprentice sat side by side, gazing unblinkingly at Rhys's face.

"There can be no betrayal, Speaker Keere," Rhys reminded him, "where no loyalty has been established. You are laying siege to this colony. Attempts at escape or communication are to be expected. The only betrayal here was of the governor's trust. In his attempts to deal with you in good faith, he has requested that his people show no hostility—that they cooperate with you, despite the fact that you threaten their lives—"

Keere whirled to face him and Brasn uttered a sharp cry.

Rhys regarded both bemusedly. "How have I offended you? I have simply stated the facts. The humans here are terrified. What else would impel some of them to attempt such a foolish and dangerous thing as to launch an unarmed ship into the arms of an enemy fleet?"

"Please," said Brasn, almost cringing, from Rhys's words. "Please, we wish to be no one's enemies."

"Then why come to us armed and in such strength? Your ships hover over us like birds of prey. Our people are fearful for their lives. Are you telling me they have no reason to be?"

Brasn and Keere traded unreadable glances. "We did not know what to expect," said Brasn. "We . . . chose a display of force—"

"Some among us," Rhys persisted, "have concluded that you return to this world as the conquerors and destroyers of its native race and culture. That you stole the sense-stone technology you are now using to convince us of your (false) claim." His eyelids at half-mast, Rhys braced himself for the Tsong Zee reaction.

"This is absurd!" cried Keere. The seamless, glossy face could not disguise his anger. "We are not liars! Nor are we criminals. Nor are we conquerors." He turned to Brasn. "This is not the way it was to have been, Brasn. We are not monsters, yet these creatures take us as such."

"It was you who suggested we attempt a show of strength, Keere," the older Speaker replied mildly. "You voted for such a tactic. *Now* you are uncertain?" His words carried the spice of sarcasm.

The Trader pressed downward on the empty air with flattened palms. "I was wrong," he said, and turned to

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Rhys. "Our intent is not to conquer. Our intent is only to prove our claim to this, our world."

"By threat of force? Or do you now claim that the massive fleet we're besieged by is an empty threat?"

"No, not an empty threat," said Brasn slowly. "We could simply . . . exterminate all of you. There would be ample time for that, even if the freighter was able to summon your fleet."

Rhys spread his arms and rose from his chair. "Then perhaps you should do so. Your threats would seem to make any proof irrelevant—"

"No! *Not* irrelevant. We have no wish to cause you undue distress. We simply wish to have our home returned to us."

Rhys made a Tsong Zee gesture that said, "Help me to help you." Palms up, he pushed his open hands, endmost fingers linked, toward the Tsong Zee Speaker. "If I could be convinced of your story of Keys and Shrines . . ."

Brasn rose from his own chair and paced around it. His apprentice eyed him anxiously while Keere kept impassive eyes on Rhys and Rick.

"Speaker Rhys, if you were Tsong Zee there would be no problem with certitude. You would simply know we spoke the truth; the Trade would prove it."

Rhys glanced significantly at Rick. "The Trade? What is that?"

"It is the way in which we have come to solve our differences over the last two millenia. We have developed the ability to . . . empathize with each other. No, it goes much beyond that. When two Tsong Zee deal in kind, they visit each other's hearts and minds. They . . . trade places with each other."

Rick let out a low whistle. "Walk a mile in my shoes!" he murmured.

Rhys felt a hot, white eagerness rippling beneath his fetish bag. Trade places! The very idea of it was . . . astounding, exhilarating, terrifying. "Are you so sure we cannot negotiate in kind, Brasn? We are men. You are men."

"If you were men," said Keere cuttingly, "you would have felt immediately the sacredness of this place you call Haifa."

Brasn made a hissing noise with his bifurcated upper lip and rounded on Keere as if to admonish him, but Rhys gestured him to calm, turning to Keere himself.

"How do you know we have not felt its sacredness? We have named it after a most sacred place on our own homeworld. Is that not significant? Of the mountains that march away from this city, we have named many after the most sacred mountains of our own world: Carmel, Paran, Sanai to name but a few. Does that not mean something? Every human being I have talked to feels something special in their heart of hearts for this world. Which is why Trader Beneton and others are willing to fight to hold it." He knew he was giving Beneton the benefit of a huge doubt, in that, but—

"I had thought Trader Beneton's attachment to Tson was rather more material than spiritual," said Brasn, his mouth twisting oddly to one side.

"I make no excuses for Trader Ben-

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eton," said Rhys. "But I can tell you that I, too, feel the . . . uniqueness of this world. I am not immune to its beauty. And I can also tell you that Trader Price was so intoxicated with it that after only a few days here she felt the desire to stay for the rest of her life." Again, he made the help-me-to-help-you gesture and said, "It may be that I cannot deal with you in kind, but should we not be sure of that before we discard the idea? Is there any way we can try?"

Keere and Brasn shared a long look. To Rhys, who was learning to decipher those cryptic glances, it was eloquent.

"We will have to discuss this among ourselves," said Brasn finally. "Speakers Javar and Parsa will have to be consulted as well."

"And what shall we be consulted upon?" The outer door had slid back silently, framing Javar and Parsa—without their apprentices for once—and an unsmiling Yoshi Umeki.

It was Javar who had spoken, and he now moved to seat himself in one of the comfortably padded chairs that formed the circle of consultation. Parsa and Yoshi followed him into the circle, separating only at the last instant to take seats with their respective "sides." Yoshi signaled Rhys urgently that she wished to speak with him, but he was distracted by Brasn's voice.

"Speaker Rhys wishes to attempt the Trade."

Both Tsong Zee uttered expressions of perturbation and turned their startled eyes to the Human Speaker.

"Is this possible?" asked Parsa. "Only Tsong Zee can make the Trade. Is that not so?"

"That is what we have always believed," said Brasn. "But perhaps our beliefs must now be challenged. We will discuss this when we adjourn to our vessel."

"There is nothing to discuss," Keere insisted. "It is impossible for one of these creatures to Trade with us. They are not Tsong Zee."

Creatures. It was the second time Keere had used the term. If it translated accurately, it indicated the Tsong Zee thought of them as intelligent animals—what science fiction writers had once called "sentient beings." Sentient, but not *Men.* Rhys was twice as determined to undertake the Trade. It might be the only way he could convince the Tsong Zee that Keere was wrong.

"I would like to try," he said and, with the force of facial expression and gesture, attempted to impress them with his strong and sincere desire.

Beside him, Yoshi fairly vibrated, obviously bursting with untold tales. Under normal circumstances he might have let her stew for a few more moments—maybe until she began to wave her hand and jump up and down like an over-eager schoolgirl—but yielded to the urgency of the situation and asked the Tsong Zee for permission to withdraw.

"It is near time for us to return to our vessel," observed Brasn. "We shall conclude our consultation there."

"Report, Yoshi?" Rhys asked when

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the door to the foyer had separated them from the Tsong Zée.

"I think you'd best hear it in the privacy of our headquarters, sir," she murmured, and headed in that direction, favoring the office staff with sidelong glances. Rhys and Rick shared a sidelong glance of their own, and followed.

Once inside, Rhys moved to peer from the window of the office. Adjacent to the governor's suite, it looked out onto the front plaza of the administration complex. There was still a crowd of people milling rather haphazardly below, some carrying vid-banners proclaiming militant slogans in slowly moving amber letters. Flowers had been dug up, trees ripped from their containers and islands. Hate slogans decorated the walls about the court, replete with unflattering portraits of the Tsong Zee.

When Yoshi remained silent, he turned to look at her. She was examining the comlink's security scanner. "What are you—?"

"Just making sure no one's listening in." She came to stand beside him at the window, a look of obvious distress on her face. "I observed the lieutenant governor engaged in surreptitious dealings with Mr. Beneton. While you were all up at the dig with Dr. Kuskov, Ms. Goodyear went out on an errand of her own. She was acting very strangely, so I followed her. She went down to the car park and met Mr. Beneton right underneath that large number '4' on the inner north wall by the lev-tubes. I was in a tube, so I couldn't hear them, but I saw Mr. Beneton hand Ms. Goodyear a holo-wafer which Ms. Goodyear then returned to the governor's private data lockup. After she left his office, I slipped in and checked to see which one she'd replaced. It was one of your sessions with the Tsong Zee Speakers."

Rhys took a deep breath. Alleen Goodyear—traitor or super-patriot? "Well, Roddy, Yoshi has found our mole. Good work, Yosh." He gave her a pat on the back. "I can't say I'm terribly surprised."

"Yes, sir. Thank you, sir.... Mole, sir?"

"A sly little bugger who creeps beneath the sod and occasionally causes aggravation and wanton destruction." His eyes returned to the window with its stunning view down Haifa's broad main boulevard. "We'd better let Joseph and Danetta in on this." ■

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Stephen L. Gillett, Ph.D.

CARBONOSIS: ORGANIC DESICCATION AND THE FERMI PARADOX

How a planet turns out depends in strange and subtle ways on "the luck of the draw"!

All *Analog* readers have heard of the Great Silence: if the Earth is an average planet around an average star, and life is ubiquitous, Where Are They? It's trivial to show that settling the Galaxy takes a geologic eye blink once even a marginal interstellar drive is developed. (Since Enrico Fermi is reputed to have first pointed this out, the absence of obvious extraterrestrials is often called the Fermi Paradox.)

One obvious explanation is that hurdles on the way to spacefaring intelligence may be a lot bigger than has been assumed. Even given a generally Earth-like environment, for example, many biologists think the path to technical intelligence is a lot more rocky than assumed by "contact optimist" astronomers; see Stephen Jay Gould's essays, for example. Alternately or additionally, the Galaxy could be a lot more dangerous than is usually thought for Earth-like biospheres, as scien-

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tist and SF writer David Brin has noted (see, e.g., *Analog*, April 1983).

As far as that goes, though, Earth-like planets may be a lot rarer than has been thought. It's not that they're "just" destroyed by galactic catastrophes; they're not even formed in the first place!

And one variable on the way to forming an Earth-like planet might be the complement of elements it's made out of. In two previous *Analog* articles, ("On Building an Earth-like Planet," July, 1989, and "Forging Planet Stuff," November 1990) I talked a bit about how the elements get made and then incorporated into rocky planets such as Earth. Because most elements lighter than iron seem to be made in pretty much the same ratios, the usual way to get variations in planetary element abundance is by chemical fractionation, rather than by variations in nucleosynthesis (i.e., the formation of the heavy elements themselves in massive stars).

Thus, for example, the ancient, iron-poor planets Poul Anderson describes in his story "Iron," and his novel *The Man Who Counts* probably couldn't result in the way he describes: even though the early Universe contained less iron overall, the proportion of iron to other heavy elements would be about the same as it is now. The most likely variations in nucleosynthetic abundance are in elements heavier than iron, because they *take* energy to make, and hence they require a massive source of energy such as a supernova.

However: there probably *is* one very significant variation in the proportion of light elements that stems directly from a difference in original nucleosynthetic processes: the carbon-to-oxygen ratio. This has been mentioned offhand in the technical literature (Larimer, 1975; Larimer & Bartholomay, 1979) but no one seems to have pursued its implications (and I hadn't seen it either, till recently, or I certainly would have mentioned it before!) Among other things, high C/O could lead to iron-depleted worlds such as Poul describes.

In our Solar System, the carbon-to-oxygen (C/O) ratio seems to be unusually low. It's about 0.6: 6 carbon atoms for every 10 oxygen atoms. This suggests a really massive supernova formed a lot of the elements in our System. (A supernova, as most *Analog* readers will already know, is a massive star that explodes after it runs out of nuclear fuel, due to rebound from the sudden, catastrophic gravitational collapse of its core. Supernovae are the main element factories in the Universe.)

Such a hot supernova preferentially makes the "alpha-particle" nuclei, which are carbon-12, oxygen-16, neon-20, . . . all the way up to calcium-40. All these nuclei can be thought of as being made up of alpha particles (helium-4 nuclei). And of these, oxygen-16 is made far and away the most abundantly, as

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it's an exceptionally stable nucleus. (Carbon-12 is also exceptionally stable, but such a supernova makes more O-16 than C-12, simply because the sheer intensity of the nuclear reactions piles on the alpha particles.)

Less massive supernovae make more carbon-12, and such non-supernova element factories as planetary nebulae and novae make a *lot* more carbon than oxygen, both carbon-12 and the heavier stable isotope carbon-13. (A planetary nebula, such as Ring Nebula in Lyra, is the gaseous envelope blown off by a low-mass star on its way to becoming a white dwarf; whereas a nova, of course, is a periodically exploding star. Novae are now thought to be white dwarfs that receive gas spilling from a close-orbiting red giant. When the gas builds up enough, it explodes, like a white dwarf-sized hydrogen bomb, and thus blows some newly formed light elements back into the interstellar medium.)

The main reason less massive stars make more carbon than oxygen is they don't process C-12 all the way to O-16 very efficiently. They also make a lot more carbon-13 because they have a lot of free neutrons flying around so they can glom onto C-12 nuclei. (Such stars also make some oxygen-17 and oxygen-18, the two heavier stable isotopes of oxygen.)

The upshot is our Solar System formed from a nebula, maybe as part of an "OB association" like that in the Orion Nebula today (e.g., Schramm & Olive, 1982), into which a massive supernova had apparently injected a lot of newly forged O-16. (And sure enough, the C-12/C-13 ratio in our Solar System is also higher than usual, as you'd expect from this scenario.)

Now, it turns out the carbon-to-oxygen ratio has profound implications for planetary evolution—and for life. When the C/O ratio gets up around 0.9, the chemical evolution of the nebula, as it condenses into planets, already differs significantly from the path our Solar System followed, and if C/O is greater than one the evolution is very different indeed. Ironically, having more carbon, the basic element of life, becomes a *problem* for arranging a living world!

C/O ~ 0.6: The Solar System

To see why, let's look at what happened in the nebula from which our Solar System condensed about 4.5 billion years (Ga) ago. At first glance, it's hard to see how the C/O ratio could matter: there are vastly more hydrogen atoms around than all the oxygen and carbon atoms put together! So you'd think both elements would just be combined with hydrogen, to make methane (CH_4) and water.

This isn't true, for two reasons: First, at the high temperatures close to the proto-Sun where the inner planets would eventually form, carbon monoxide (CO) is the most stable oxygen-containing—and carbon-containing—chemical compound. So, all the carbon is tied up

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in CO. Only the leftover oxygen is free to form other compounds. These include some H_2O as well as a little bit of other high-temperature oxides such as AlO and SiO.

Second, even in the cool interstellar gas from which the solar nebula originally collapsed, CO rather than methane was probably the main carbon-bearing gas. (And similarly, most nitrogen was present as nitrogen gas—N_2—rather than as ammonia [NH_3].) Although—just as you'd figure—under cool, hydrogen-rich conditions NH_3 and CH_4 are the most stable compounds, the reaction rates are so sluggish—and the material is so thinly dispersed—that it would require many times the age of the Universe for the interstellar gas to achieve chemical equilibrium. CO (and N_2 as well), however, can be formed in expanding gas clouds, such as in the debris left after a supernova or nova explosion. They can even form in a red giant's atmosphere, where they can be expelled by its stellar wind—the ongoing tenuous outflow of gas. Thus these compounds are initially formed in hot, somewhat denser gas and are then preserved in an interstellar "deep freeze."

The "ammonia-and-methane primordial nebula" has been traditional for 40 years, based on chemical equilibrium arguments, but it seems not to have ever existed. (The abundant CH_4 and NH_3 in the outer planets probably formed there when the protoplanets were condensing. Conditions were much more favorable for reaching chemical equilibrium in a thick protoplanet atmosphere.)

Anyway: as the hot nebula cools, methane and water finally become more stable than CO. Some CO can then react with H_2 to form water and hydrocarbons (as well as some other simple organic compounds), by the so-called Fischer-Tropsch syntheses. An example is:

$$CO + 3\ H_2 \longrightarrow CH_4 + H_2O,$$

or in general,

$$n\ CO + (2n+1)\ H_2 \longrightarrow C_nH_{2n+2} + n\ H_2O.$$

These reactions are well-known because they're very important in industrial processes. But that same industrial experience also shows they happen very slowly by themselves, and to have reasonable reaction rates you need a catalyst. Again, reaching chemical equilibrium is thwarted by (relatively) low temperatures!

Iron metal works as a catalyst, and there's lots of native iron in the nebula: in fact, iron droplets are one of the first things to condense out. So a catalyst is available. Unfortunately, though, iron surfaces easily get "poisoned," either by iron sulfide (which also begins to form as things cool), or by gummy carbonaceous coatings (residues from the Fischer-Tropsch synthesis itself!). In fact, in carbonaceous chondrite meteorites, which are probably as close to samples of original nebula material as we're likely to get, we often see agglom-

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erations consisting of "tars" sticking to iron pellets. They might well be left over from Fischer-Tropsch reactions in the nebula.

Thus, the problems with catalysis mean the Fischer-Tropsch synthesis remains incomplete—maybe very incomplete—in the cooling nebula. Prinn and Fegley (1989), for example, estimate that only 10% of the CO in our solar nebula managed to get converted.

Another important thing happens when the temperature starts to fall. Hot water vapor can start reacting with metals to form refractory (high-melting point) oxides and silicates, things like spinel ($MgAl_2O_4$), nepheline ($NaAlSiO_4$), melilite ($Ca_2[Mg,Si][Al,Al]SiO_7$), and others. As the nebular gas cools further, these react further to form more familiar silicates, the sorts Earthly rocks are made of, things like olivine and feldspars and pyroxenes. Water vapor also starts to oxidize iron metal, so these silicates contain a lot of iron in its +2 oxidation state (Fe^{2+} or Fe[II].) Eventually, even hydrated silicates such as clay minerals can form by direct reaction of water.

Obviously, such reactions can use the water made as a byproduct of the Fischer-Tropsch synthesis once it's available. But, since the Solar System had extra oxygen to start with, the nebula *always* had some water vapor (and indeed some other oxides), even at high temperature. So even those very first refractory silicates and oxides could form by reaction with water vapor.

Now consider what happens when this raw planet-stuff finally gets gathered together into a rocky planet. The leftover iron-nickel metal sinks to the center and carries most of the sulfides (which are also denser than the silicates) with it. (It also carries off most of the cobalt and platinum-group metals.) The silicates end up floating on the metal, where they eventually fractionate into a denser mantle and lighter crust. Last, the leftover CO in the nebula, along with all the other leftover gases, gets blown out of the inner System when the Sun finally ignites.

Look what we ended up with: a planet whose surface consists mostly of silicates—rocks—that are stable in contact with water; i.e., they're sufficiently oxidized that they won't break down water to extract oxygen and release H_2. Some silicates, such as clay minerals, even had water—or at least hydroxyl groups (OH^-)—incorporated in their structure. When cooked in the growing planet, such minerals can break down to release water, which is then outgassed from volcanoes. A substantial amount of oxidized iron also ends up in the rocks of the mantle and crust—an important point, as we'll see.

Finally (and also very important!), notice that all the extra nickel-iron metal, and most of the sulfides, end up tucked away in the core. There they're safe from any further reaction (or at least any extensive reaction) with surface

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rocks. In particular, they're completely isolated from surface water.

C/O > 0.8; The Typical Nebula?

Now let's look at what we end up with if we start with a nebula having C/O ~ 1, a value that seems more typical of the Universe.

First off, at high temperature all the oxygen is tied up in CO. Thus there's no water to start with because there's no oxygen left over! So, the first refractory minerals, precipitated when the nebula starts to cool, are high-temperature nitrides and carbides, rather than oxides: things like silicon carbide (SiC), titanium nitride (TiN), aluminum nitride (AlN), and so on, all of which are hardly familiar as minerals!

Apparently even our own nebula had high C/O ratios locally. The "enstatite chondrites" are a rare class of meteorites that reflect extremely chemically reducing conditions. They contain an extraordinary mineral assemblage that seems to have formed under just the conditions you'd get if C/O were unusually high.

These meteorites consist mostly (over 50%) of the mineral enstatite, a magnesium silicate ($MgSiO_3$) that gives them their name. Now, enstatite is a pretty common mineral—it's abundant in Earth's mantle, for example—but this enstatite is unusual by terrestrial standards, because it's nearly pure $MgSiO_3$. Most enstaties also contain anywhere from a little to a lot of iron in the +2 oxidation state. (As we saw above, for example, there's lots of iron-II in Earth rocks.) The iron-II substitutes for the magnesium: since the Mg^{2+} and Fe^{2+} ions are almost the same size, either fits nicely into the same site in a silicate crystal. In fact, Fe(II) and Mg usually substitute so freely for each other in natural materials that geochemists speak affectionately of "ferromags" (ferromagnesian) or "mafic" minerals—those containing iron-and-magnesium.

In enstatite chondrites, though, all the iron is either reduced to metal or else is tied up in sulfides. In fact, these chondrites even contain sulfides of elements much more electronegative than iron, such as calcium sulfide (CaS—the mineral "oldhamite"). We also see weird nitrides, minerals unknown anywhere else outside of reagent bottles, things like titanium nitride (TiN, osbornite), and silicon oxynitride (Si_2N_2O, sinoite—discovered only in the '60s), and phosphides such as schreibersite ([Fe, Co, Ni] P.) The very iron-nickel alloy itself contains a few percent of metallic silicon!

So, what reflected local and unusual conditions in our nebula would be the norm in a nebula with a high C/O ratio: the first things to condense would be high-temperature nitrides, carbides, and so on, instead of oxides, and the metal would even contain some free silicon.

What happens as such a nebula is cooled further? Eventually, to be sure, H_2O vapor will begin to form

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by Fischer-Tropsch reactions, just as in our nebula, and that water can in turn react to form oxides and silicates. So it might seem the only thing different that happens is that we get those unusual refractories to begin with.

But: the total H_2O formed will be much less. In our nebula, Fischer-Tropsch reactions only converted about 10% of the CO to water and hydrocarbons, and there's no reason to think the reactions will be any more efficient if the nebula is richer in CO. And since the F-T reactions are the *only* source of water in a high-carbon nebula, water vapor in such a nebula will always be much less abundant—less than 20% or so of Solar System abundance.

This has one crucial effect: none of the iron will ever get oxidized. It will all stay as metal and sulfide*. Only the most electronegative metals will end up in oxides or silicates: magnesium, the alkali elements, calcium, aluminum, most of the silicon.

But no iron will. Just as in the enstatite chondrites, we'll end up with "ferromagnesian" minerals that have no "ferro"!

More than that, though: even this results only if chemical equilibrium is maintained. But as we've seen, chemical equilibrium generally *isn't* maintained, especially at low temperatures where chemical reactions become sluggish. As the nebula cools, only those early-formed minerals that react easily will be consumed in further reactions. For example, since aluminum nitride reacts readily with water, we might expect it to be converted to oxide. On the other hand, SiC and TiN don't react easily, especially at low temperatures, and they will persist. (As is shown by everyday experience: SiC is made commercially as an abrasive under the trade name Carborundum, and you commonly use it, as you do any abrasive, in a water slurry! With no problems whatsoever: the water does *not* bubble up into hydrogen and methane before your eyes. At room temperature, SiC and water just don't react, even though Carborundum is thermodynamically unstable.) Thus, things like TiN will survive at lower temperatures, just as they did in the enstatite chondrites.

The bottom line is that not only will there be no oxidized iron in the silicates, but the rocks will contain in addition some highly reduced solid species such as nitrides and carbides.

Thus, let's now consider making a planet from such raw material, stuff that's even more chemically reduced than enstatite chondrites. To be sure, like solar planet-stuff, it contains silicates such as feldspars and ferromagnesian minerals (although the "ferro" is now a misnomer!), along with free nickel-iron alloy. But such material will also contain a salting of other reduced compounds such as carbides, ni-

*Yes, yes I know: technically, iron in a sulfide is "oxidized," too, since it's lost binding electrons. But for this article it's convenient to use "oxidize" for reaction with oxygen only.

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trides, phosphides, light-metal sulfides, and so on.

What happens when we stew all this together? Obviously, it would take a sophisticated computer program to give many details! But we can certainly make some qualitative statements.

First, just as in the Earth, all the metal (which will also contain some metallic silicon) will sink to form a core. No doubt, too, a lot of the sulfides will go along with the metal, just as they did in the Earth. Certainly at least the dense sulfides will also sink.

But, that core will contain essentially *all* the iron! No iron will be left behind in rock. This means iron will be like cobalt and nickel on the Earth: very rare at the surface, because nearly all went into the core when the planet was formed. Thus we have made a low-iron planet (or rather, a low surface-iron planet) just through the vagaries of chemical fractionation.

Next, as on Earth, silicates will float atop this core to form a thick rocky mantle, from which a crust will no doubt chemically differentiate. The silicates will contain the highly electronegative metals, such as the alkali metals, aluminum, magnesium, and certainly most of the calcium and silicon.

But this "rocky" part will also include more chemically reduced species—carbides, nitrides, and so on—that weren't dense enough to sink into the core. Silicon carbide, for example, has about the same density as olivine, a typical mantle silicate, and sinoite has a density about like that of crustal rocks. The light-metal sulfides are light, too; oldhamite, for example, is no denser than feldspar.

And *this* poses a major problem for a life-bearing world, because water is not thermodynamically stable in association with such compounds. Even though, for example, SiC reacts sluggishly with H_2O under normal conditions, it will react just fine under the heat and pressure of the subsurface—especially over geologic time!

We can't keep the surface water and crustal rocks from reacting, either. You might think we could sequester the oceans atop the surface, but that won't work. On an Earth-like planet, plate tectonics continually cycles water back down into the lower crust and mantle, because seawater is carried down at subduction zones. In fact, that water is probably critical in maintaining plate tectonics! It acts as a lubricant: without a smidgen of water to lower their viscosity, upper mantle rocks would be far too strong for the plates to slide over. (See my article in the July, 1989 *Analog.*) In fact, most of terrestrial volcanic gas is just recycled seawater.

The upshot, then, is that lots of water-eating compounds are left in the rocks—the planetary crust and mantle—rather than safely quarantined in the core as happened on Earth. And to boot, less water was formed in such a nebula: there will be only that made by Fischer-

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Tropsch synthesis.

Thus, even if such a planet starts out with oceans, they'll be consumed over geologic time. As seawater is subducted, the water is destroyed and hydrogen released via such reactions as:

$$SiC + 2\,H_2O \longrightarrow SiO_2 + 2\,H_2 + C$$

So when the seawater is subducted, only hydrogen comes out again!

And again, we can't appeal to sluggish reaction rates to stop this. Even those compounds, such as SiC, that won't react at room temperature will react enthusiastically under the heat and pressure of the crust and upper mantle.

Thus, an embryonic Earth-like planet formed from a high-carbon nebula will tend to lose its water: oxygen from the water will oxidize more electronegative elements in the crust, with the release of hydrogen. And, of course, hydrogen released back to the atmosphere will be lost to space right away, as an Earth-size planet doesn't have enough gravity to keep it.

All in all, then: A proper Earth-like planet seems to need a nice hot supernova in the vicinity of its nebula, to squirt in all that O-16 and keep things sufficiently oxidizing! Or, to use the word I coined for the title: to avoid possibly terminal carbonosis, one large prenatal injection of O-16 is required. . . .

Technology and Carbonosis

There is one fly (at least) in this scenario: Earth may have an unusually small amount of water for an ocean world. And even though water won't form efficiently in a carbon-rich nebula, there should be plenty to make all the oceans we could need. After all, even a huge ocean makes up only a tiny proportion of a rocky planet like the Earth.

The water need not even have come from the vicinity where the planet accreted, either. Much of Earth's H_2O, for example, may have come from the outer Solar System. It might have arrived late in planetary accretion on the bodies composing the "late heavy bombardment," which left the spectacular scars on the Moon, Mars, and Mercury. On a world as small as the Moon any water from such an impact won't remain, even if the impactor were solid ice. The Earth, however, has plenty of gravity to keep the water, even from a very large impact.

In fact, Brin has proposed another contribution to the Fermi paradox; maybe most Earth-like planets have too much water! With no (or little) land area, even if intelligent life arises, technological life seems permanently stymied.

For consider: When we talk about the Fermi Paradox, we are not talking about just life itself, or even just about intelligent life: we mean space-talking or space-faring intelligent life. Conceivably, the abundance of life, and even of intelligence, could be large, but for some reason (or more likely, for any of a host of reasons) developing the technology for interstellar communication—much less interstellar

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travel—is extremely rare.

So we're not looking for just intelligence; we're looking for technical intelligence. Hence, a little carbonosis—a little organic desiccation—may be just what the doctor ordered. It may be a way to get rid of excess water and thus make a planet more Earth-like.

But a carbonized world still has a big problem for evolving technology: iron. As I emphasized above, with high C/O in the nebula, all the iron remains as metal or sulfide and ends up in the core. None ends up in the crust where it would be accessible.

By contrast, in Earth's crust—and even more so in its mantle—iron is a common element. Even in the crust, it's fourth most abundant, after oxygen, silicon, and aluminum (in that order).

(In fact, iron in its various oxidation states accounts for most of the color of ordinary Earth rocks: those pallid greens, deep blacks, light tans, pale oranges, and bright reds. Metallurgists and ceramicists refer to such things as calcium oxide, magnesium oxide, silica, the alkali oxides, and so on as the "white oxides" for a reason! Iron compounds are colored because iron is a "transition" metal, in chem-speak. It has a less-than-full complement of electrons in a middle shell; the *d*-electrons, for you chemists out there. These electrons have much more closely separated energies than do the electrons in metals like calcium or magnesium, such that even visible light has enough energy to move them around. Thus various wavelengths of visible light can be absorbed.

(Other transition metals, such as manganese and copper, also make colored compounds, but they're a lot rarer on Earth. Even manganese is less than 10% as abundant as Fe—and on a world suffering from carbonosis, the manganese will also have ended up in the core.)

Anyway, the abundance of iron in Earth's crust is fraught with significance for technology. Of the common metals, iron is the most easily extracted. It can be reduced with extremely primitive technology, by a process several thousand years old:

$$Fe_3O_4 + 4\,C = 4\,CO + 3\,Fe$$

magnetite charcoal

Effectively, of course, this is the inverse of the solar-nebula reactions. Again, at moderately high temperatures—even the temperatures that can be reached by a crude forge—carbon monoxide is more stable than iron oxide, so the oxygen tends to go away with the carbon instead.

And this profound effect on technology, of course, was a major point of Poul Anderson's stories on "low-iron" worlds. Without the knowledge or the ability to extract the extremely electronegative metals such as aluminum and magnesium, which are tightly bound in silicates and oxides, even a highly intelligent species will have difficulty getting beyond a Bronze Age. Iron will be a rare metal, rarer even

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than copper, and known only from meteorite falls. Maybe eventually a technology could arise, based perhaps on electrolytic techniques, but more likely a technical civilization will be stillborn forever. (As Jerry Oltion notes, a high-tech civilization that *does* manage to arise is likely to see the long, long gap between the Bronze Age and the Aluminum Age as the major barrier to the rise of technical civilization!)

Even if a planet escapes the worst effects of carbonosis, therefore, and has liquid water left over once its crust has been fully oxidized, it's going to be a poor place for a spacefaring—or even a spacetalking—civilization to arise.

Another life form stuck on its home planet due to the quirks of local chemistry. . . . We *need* to get busy and develop interstellar travel: the Universe is depending on us! ■

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These authors made an offhand suggestion that "perhaps the search for life . . . should be limited to stars with C/O < 0.8." The suggestion has apparently been overlooked ever since, both in SF and in the technical literature!

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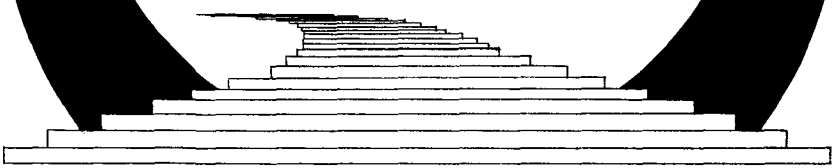

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THE WORTING'S TESTAMENT

Rob Chilson

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Great tragedies can spring from trivial misunderstandings—and between products of different evolutions, misunderstandings can be far from trivial!

Illustration by Todd Cameron Hamilton

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A worting lived in the great forest. Its brown house was made of chewed wood fiber glued together with the worting's own exudation. The house was round and spiraled up to a peak, and had three windows and a door. It also had a tunnel leading away through the roots of the old eo-oak tree it sat under. From the trapdoor in the top, the worting could climb up into the eo-oak, and so escape that way. Around the house was a palisade of stone and timber posts, against the beasts of the great forest. Scattered through the forest near the worting's house were the houses of a number of other wortinga.

One market day the worting was pushing its barrow down the road through the edge of the great forest, when a man-kin came by on a fine, fast riding beast.

"Say, exozootic, you have what in your barrow, eh?" the man-kin asked.

In the Adolescent Houses, the worting had learned The Light of the World, as the man-kin language is called. "I have in my barrow the skulls and carapaces of my offspring, heh," it said. It was careful to end its Utterance with the proper Executant that identified it as a response to the man-kin's question.

"I have heard of this custom of some exozootics, of killing their children," said the man-kin. Man-kin seldom trouble to learn the true names of peoples from the stars, calling them all *exozootics*. Its volaunt danced about. "It troubles you to kill your children, eh?"

The worting pondered this question for three respirations. The man-kin do not slay their offspring? it wondered. "It does not trouble me, heh," it said.

"Our roads diverge; to each his own road," said the man-kin. "I could never follow your road, ha! But may the Long Father be with you on your own road, exozootic." And the man-kin rode off as swiftly as the wind.

"Eat well," said the worting.

Lifting its barrow, it trundled along the road, pondering the man-kin's words. How could the children of the man-kin be planted if they were not slain?

At the town of the man-kin, the worting was stopped at the outer wall. Man-kin stood about, with weapons.

"Market day has but dawned, and already the wortinga arrive, ha!" cried one of the man-kin. "You are the first, old worting."

"I saw no wortinga before me," said the worting. It sought to thrust its barrow past them.

"You cannot pass," said the man-kin. "There is a tax upon all goods entering the town."

"A tax is what, eh?" the worting asked, confused. Always before wortinga had been admitted to the town on market day, to sell their produce.

"A tax is money, a fee, an impost," they told it.

"But the wortinga have no money," said the worting. "We cannot enter, eh?"

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"You can enter, but you must pay, ho," said the man-kin, commanding.

"I cannot pay without money," said the worting. It stood holding the handle of its barrow.

"It is not a great sum," they told it. "It is merely a few spuds—two or three copper unciums—or for this fine load of skulls and carapaces, perhaps a silver star."

"I have no money at all," the worting said.

The man-kin took counsel together and presently one said, "We shall take one skull of your load, for the tax, ho. If you do not wish to pay, we cannot let you enter."

The worting hesitated. "But I must have paint, and cloth, and netting, and glue, and brass and iron nails, and other things of iron, and I wish also to have spices grown from plants from far-off—" it made a sound that the characters of The Light of the World cannot reproduce. "What you call Euphrosyne, whence the wortinga came."

"Oh, there will be enough left," they told it.

"Then, I will pay," it said.

The worting selected the finest and largest of its skulls, a skull that glistened like polished ebony, and presented it to them, genuflecting. They allowed it to pass, and it crossed the fields and passed through the inner wall, and stopped in the market place in the shade of its usual tree.

After a little while the man-kin who buys the skulls and carapaces came hurrying from one of the man-kin buildings. "Old worting!" he said. "I hurried through my morning meal, knowing that you would be early. The younger wortinga sleep late, eh?"

"They linger before departing, heh," the worting said. It spread a canvas upon the grass and laid the skulls and carapaces of its offspring upon it. The worting knew how the man-kin like for the skulls and carapaces to be. It always cleaned and polished its skulls and carapaces meticulously, and it was careful to slay its offspring in such a way as not to damage them.

The man-kin began to lift and study the skulls and carapaces very carefully.

"You slay your offspring, eh?" the worting asked.

The skull-buyer looked up, looked back at the skulls and carapaces. "No, we rear them all. Of course we have far fewer than you."

The worting's armpits were heavy with eggs. Tomorrow it would move them to the sand pit. Every four weeks there would be another hatching, and an earlier hatching to slay and plant. Of each hatching, only one or two would grow. If more grew, there would be no room on this, the First World of the man-kin, for all the wortinga. Why did not the man-kin overrun their world? it wondered.

"A fine lot of bones," said the man-kin, straightening up. "I shall take them all. Give me the list of things you wish to purchase."

The worting recited the list of its desires and the man-kin wrote

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them. "I will return shortly," he said. He departed to the buildings of the man-kin.

Patiently the worting waited.

Presently a number of man-kin offspring came running through the market place, throwing a round thing from one to another and making much noise, like hatchling wortinga. Some came over to observe the worting's skulls and carapaces.

The worting asked them, "Your parents plant you in what manner, eh?"

"So, the old worting speaks like a man-kin. Our fathers plant us in our mothers, ha! No, no. Our fathers do not plant us."

Many spoke at once and the worting found it difficult to understand them. "Your parents do not slay you, eh?"

"Slay us, ha! Yes, my father slew me last night—see my eye! Our fathers do not slay us, indeed."

"How then are you planted, eh?" the worting asked, but so great was the noise that none heard it. It had to ask twice more before any of them attended to it. By now all the man-kin offspring had gathered around and their noise was great. Others were coming, and some of the adult man-kin heard the confusion.

"We are not planted, ha! Our parents do not plant us. We are not wortinga, to kill and sell our children."

The worting was greatly puzzled by all this noise. "How then are you reared, if you are not planted, eh?" it asked them.

"We grow, ha! We grow without being planted! We are not like you!" Many times they said these things and other things like them to the worting, always using the executant of exclamation.

Presently the skull-buyer pushed through the crowd with a wagon and began to load the worting's goods into the worting's barrow. Still the offspring stood about and shouted, till the buyer silenced them.

"I thank you, sir, for your consideration, huh," said the worting with ceremonial politeness, including the declarative executant that man-kin usually omit.

"Eat well, huh," said the skull-buyer.

The worting started to push its barrow away, but it was stopped by a number of adult man-kin, who stood before it.

"Hey, old worting," one said.

"Yo," the worting said, the response to being addressed.

"You speak of killing children. You kill your children, eh?"

"Yes, heh. Every four weeks I must slay my hatchlings and plant them. Some will grow and thrive. Most will not."

"We have heard that this is the case with the wortinga," said the man-kin. "But you kill man-kin children too, eh?"

The worting was confused. "No, heh. It is the task of each parent to slay its own offspring."

"Three days ago a man-kin child disappeared. Some say she was taken by the beasts of the forest.

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But some now say that perhaps she was killed by the wortinga."

"I do not understand why they say that," the worting said.

"Because your questions have made them suspicious," the man-kin said. "Again we ask: the wortinga slay the offspring of the man-kin, eh?"

"I have not done such a thing," said the worting. "I do not know if other wortinga might have done so. But I think it very unlikely. A worting would slay a man-kin offspring for what reason, eh?"

"Perhaps a mistake, thinking the child needed to be planted," said the man-kin. "Very well, old worting, you may go. Your curiosity nearly got you in trouble, but it was perhaps understandable. We find your ways incomprehensible also."

But before the worting could push its barrow very far it was stopped again. "Hey, old worting, ha!"

"Yo."

"So it is true that wortinga kill their children."

"Yes, that we may plant them."

"You would plant them for what reason, seeing that you are animals and not plants, eh?"

"No, Divvis, they are really just walking plants," another man-kin said.

"That is true, Garhelt, eh? You are the teacher, you know about wortinga."

"I know but little; little is known. I believe that wortinga partake of the characteristics both of plants and of animals. It is certain that they plant their offspring, of whom only a few grow. These develop roots and leaves, and when they are ripe, the leaves and roots wither and the worting walks away. In the meantime, the parents talk to them and thus partially educate them."

One man-kin made a loud barking noise and smote another on the back. "A quieter method of raising the children than yours, Gilly, ha!" And many other man-kin made the barking noises.

"But they can be both plant and animal, eh?" one asked.

"Their ancestors came from Euphrosyne millions of years ago, where things are not as they are here. Their name itself suggests that they are both: worting. 'Wort' is plant, and the ending suggests a living being. Plant-thing."

Seeing that the man-kin spoke among themselves, the worting again pushed its barrow, and was suffered to go. It was puzzled that there should be all this confusion about a simple question. Also, it could not understand how the man-kin rear their offspring.

The road home was long and dusty, and the load heavier than on the trip up. The worting was frequently stopped by other wortinga coming with their goods, many of them with skulls and carapaces. All who stopped examined its load and ask what it had traded for it.

Upon reaching its house, the worting carefully opened the palisade, that no hatchling escape. It wheeled its barrow into the shed and unloaded it, putting the goods

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on shelves. Next it went out and examined the palisade carefully, to assure itself that no breaches were being made by the beasts of the great forest.

It next examined the rootlings: four leaf-wrapped small wortinga standing in the sunlight in the protection of the palisade. One was of the largest size, four months rooted, and might break its roots at any time. The worting offered this one food, but it still declined, being not quite ripe. The next in size were two of three-month size. They seemed in good condition, and it spoke to them. They answered, but the worting had no time now for conversation. The smallest was but two months old, the only survivor of its hatching, and looked about very curiously. It spoke but little yet, but listened intently as the worting spoke to the older rootlings. There were two rootlings of a month old, but still quite immobile and plantlike. It had moved them near to the others three days before.

Soon, the worting thought, it would be time to place the new eggs and slay the oldest crop of hatchlings, the four-month-olds. They were running wildly about now under foot. They had thinned down the younger hatchlings by a third, playing too hard with them.

The worting went to the sand pit and spent some time shoring up one side, then made a trip to the river for sand. The pit was getting low. The hatchlings scattered it about in their running. It spread the fresh sand on top, where the sun would dry it. Tomorrow, or next day, it would place its eggs there. Afterward, the worting would slay the oldest hatchlings.

When it entered its house it was greeted by the four remaining free-foots. Already the four-month-old was developing the gray-green adult worting's carapace and mantle. It was making a knife from the worting's scrap metal. Soon it would leave, to join the others of its age in the Adolescent Houses. The three-month-old free-foot was reading a worting-script book copied from one of those brought from what the man-kin call Euphrosyne. Both had questions which the worting answered, and it showed the elder some tricks of metalwork. There was no two-month-old free-foot, and the two one-month-olds were eating again.

Four months as a hatchling, four months as a rootling, and four months as a free-foot: that is the home life of a worting.

So the worting busied itself that day, and slept that night. The next day it removed its eggs from its armpits and placed them in the sandbox, calling the oldest free-foot to watch. Two of the others also came. Then it took cords and tied the necks of all the four-month-old hatchlings. Leaving the free-foots behind, it led the hatchlings down to the river, pushing its barrow ahead. It was the worting's custom to drown its offspring, that their exoskeletons not be harmed by the slaying.

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To each of them it tied a rock, and dragged them out into the water. The hatchlings were puzzled by this and resisted more than hatchlings usually do to being slain, but were quickly drowned. Afterward the worting cut off the hatchlings' heads and carapaces and put them in a net it took from its barrow. It weighted the net with stones and sank it in the drowning pool in the river, that the water life might begin the cleansing of the parts.

The worting went back up the hill, pushing its barrow with the bodies of the drowned hatchlings. It would return for the heads and carapaces in a week and begin the further cleansing of them. The cleansing took a month, and so the worting had heads and carapaces to sell every month, as do most wortinga.

Back at the worting's house it was joined by the free-foots as it took the bodies of the hatchlings to the rootling beds. The oldest rootlings watched curiously as the worting pointed out to the free-foots signs which it thought indicated that certain of the hatchlings were most likely to sprout. These it placed closest to those already sprouted, and so on, till all were planted.

It was very hot and all were tired by that time, so at the urging of the free-foots the worting agreed to a rest time. "It will benefit the younger hatchlings to have the older away for a time," it said, putting out food and water for them. They tied the older ones and led them down to the river, away from the drowning pool, where they all splashed about in the coolness of water and shade, till after the sun's downing.

That night, they fed the hatchlings and read to and conversed with the rootlings till the light faded. Then the worting and the free-foots prepared food. They were eating in the house when blows were struck upon the house's door. A man-kin's voice was raised in cries.

"Old Worting, ha! Old Worting! Come at once! Danger, ha!"

The worting was frightened, for no beast had ever solved the latch of the palisade, and no man-kin had ever found its way to its door. In its panic it could think only of flight, and started for the tunnel. But it remembered the hatchlings and the rootlings and hesitated; then it realized that this was a man-kin, not a beast. Yet still it feared, and though it resolved to stay, it made the commanding gesture and indicated the escape tunnel to the free-foots. They departed down it immediately.

The worting opened the door, saying, "I come! What danger, eh?"

The man-kin who was there backed away from the door and the worting instantly felt less fearful. It was the buyer of skulls and carapaces. He genuflected and said, "Old worting, you have in your house any human children, eh? Any of our offspring?"

The worting wondered much at

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this strange question, but said, "No, heh, I have no offspring of the man-kin."

"And you have slain none?"

"I have slain none, heh. You ask for what reason, eh?"

The man-kin flung his hands up in the air and cried out, "Another of our children is missing, ha! And the fools have said that a worting has slain them, because of your questions on market day. Even now they are coming here to search the village of the wortinga."

Wondering, the worting said, "The wortinga have no village. Each lives apart. Free-foot offspring of the man-kin die constantly from the attacks of the predators of the forest, eh? They are slain when they are old enough to leave the house and go beyond the town palisade."

"Yes, heh, and our younger—what you would call our hatchlings—also," said the man-kin, standing with his arms and head lowered. "But the fools will not listen; now they blame you all for every death this octron."

The worting was so dismayed by this accusation that it had to struggle with man-kin enumeration to remember that an octron is 256 years. "So many, ha!" it cried. "No, the wortinga lay, and slay, and hatch, and train, only their own offspring! Nor can we sell skulls and carapaces of any others. If we could, it would not be moral."

"I believe you, old worting. I have dealt with you most of my life; my father began to buy from you when I was a—a free-foot. But I cannot be responsible for the fears of fools. Now the fools come, with weapons. All I can suggest is that you do not resist. Let them enter your house, let them search everywhere."

The man-kin departed and the worting counted its hatchlings, to assure itself that none had gotten out when the man-kin opened the palisade. Then it went into the house and considered what to do. After a long time it decided, and herded the hatchlings into a corner and put its last net over them. They commonly sleep in huddles, and so were not troubled by this. They were by turns wakeful and sleepy all night long, and if the man-kin came, it might be that some would escape and be slain by the beasts of the forest. This the net should prevent, unless the man-kin loosed them from it.

Then it hung a globe of light over the gate in the palisade, and set the latch so that it could be opened easily from without, which might be seen immediately, to signify compliance. It hung another light over its door, and left the door partly open.

Finally, the worting went up to the roof, out the trapdoor, and up into the eo-oak above the house, carrying a piece of dark cloth. Wrapping this cloth about itself, lest its exoskeleton's gleam reveal it, it waited a long time, till the man-kin came.

They bore glowing globes, and also torches, and the worting feared they meant to fire the house, but

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they did not. For a long time they tramped and ran and shouted about within, and in all the outbuildings, and every corner of the palisade, but they did not set fire. When they went noisily off, the worting still remained crouched in the tree. Not till early dawn did it descend. The contents of the house had been overthrown and greatly damaged, and the worting thought that many of its tools had been stolen. But the worting was alive. It went out, and found to its joy that none of the hatchlings or rootlings had been slain or otherwise harmed, though all seemed frightened.

Returning to the house, it called the free-foots up from the escape tunnel and they prepared food for the hatchlings, and went and spoke soothingly to the rootlings. The oldest rootling took a few mouthfuls of food, and it was clear that soon it would break its roots. But the worting took no joy in this; it feared the man-kin.

The oldest free-foot, indeed, said, "Oldest one, I fear the man-kin. Though I fear I am too young yet to profit by the Adolescent Houses, yet I will go there this day. Perhaps it will be safer for me there."

The worting agreed with this decision, saying, "It may not be safe here while the man-kin are in this confused and excited state. I believe they must feel as much for their offspring as the wortinga do for theirs, to become so hostile."

It offered to convey the free-foot to the Adolescent Houses, and the free-foot was pleased to accept the offer. And so they set off, walking rapidly, for the worting feared the return of the men in its absence.

The Adolescent Houses are those wortinga buildings which the man-kin call "Barns" or "Cathedrals"—the largest structures the wortinga make. All are now old, but since they are made man-kin fashion of piled stone and brick, with mortar, they are sound, and the inhabitants of the Houses replace the roofs and interiors when they become too aged or bug-eaten for safety. Here the adolescent wortinga live till they are adult, all ages mingling and spreading learning. Here are the libraries of the wortinga, and what the man-kin would call schools.

A worting may spend from five to twenty years in the Adolescent Houses. The worting itself had spent nine years here, leaving only when its armpits grew heavy with its first setting of eggs. It left then to build its first crude house, and in its early years moved three times, till finally it occupied the spot where its house now stood. It had outlived the first two houses there, building three upon the site of the first.

Before midday the worting and its oldest free-foot, now an adolescent, were talking to the elders of the nearest Adolescent House. The elders are barren adults, who have no reason to leave the Adolescent Houses, and assuage their grief at having no offspring by teaching the offspring of others. Also, when a worting outlives the supply of fertilized eggs laid down in its time in

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the Adolescent Houses, it returns to certain smaller houses adjacent to the Adolescent Houses, called the Senescent Houses, where it may continue to study and learn, and also to teach the adolescents.

Here certain of the oldest and wisest and chiefest of the wortinga, many of them senescents, came to the worting. It gave its adolescent into the care of the House, and came out with them into the shade of the great trees.

"Our life has been invaded by the man-kin," they told it, in the language of the wortinga.

"Our houses have been invaded; some of our offspring have been killed."

"Our possessions have been destroyed and stolen."

"We are greatly frightened. We fear for our lives, and for all the wortinga."

The worting said, "My house has also been invaded, and though none of my offspring as yet has been slain, many of my possessions have been destroyed or stolen. I also fear for the wortinga, and for myself."

"Tell us what transpired between you and the man-kin on market day."

"I asked as to the hatching, planting, and rearing of man-kin offspring. I learned that man-kin do not slay their hatchlings, and was puzzled by this, but it was explained to me that man-kin offspring do not need to sprout. I learned that, so far as I can understand it, but few offspring are hatched, and they hatch as free-foots, or perhaps rootlings. All these they cherish as we cherish our rootlings and free-foots."

The chiefs among the wortinga looked at each other and murmured together, finally agreeing: "We see no harm in this gathering of essentially useless knowledge. The man-kin, however, became angry?"

"No, they were curious as to wortinga ways, but not angry at that time. Mention was made to me, however, of a certain missing man-kin offspring. The skull-buyer believed it to have been taken by the beasts of the forest, which as we know prey upon the man-kin offspring as well as upon ours. Last night, however, the skull-buyer came to my house and warned me that the man-kin were aroused and angry over the loss of yet another offspring, thinking that I or other wortinga had something to do with its disappearance."

"Something of this was gathered from the shouts reported to us."

"But they did not find any man-kin offspring among the wortinga."

"They found none in my house either," the worting said.

"Nevertheless they are very angry and promised to return by day."

The worting became very uneasy and wished to return to its house, but remained with them. "What can we do?" it asked.

They turned to an old worting, a senescent who had studied the man-kin long and knew them well. "The man-kin fear for their off-

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spring even as we do, and now that they are roused, it may be that nothing but death will satisfy them. Our fear is that they will slay us all, or a great many of us, and destroy our place here. I think we might perhaps turn away this wrath by offering them a death, and demonstrating submissiveness."

Another worting said, "I believe that this one is right. I have observed certain acts and gestures which I believe indicate that the man-kin have rituals of submission. Unfortunately, we do not know their rituals, and no small ritual would be likely to suffice while they are in this state. A major act of submission, understandable to any species, is required."

The worting understood this. "Perhaps it would suffice to offer them my head and carapace, with the apology of the wortinga."

The wortinga considered, and finally the senescent said, "I think that they will pause if offered your bones. Once paused, those who have sense among them will surely see the absurdity of their fears."

They all stood silent for a while. During the night the worting had come to fear the man-kin greatly. In this mood they might well slay all the wortinga in the great forest. Yet, if the man-kin thought that the worting was a threat, its death should assuage their anger.

"It is the only thing that we can do," it said. "So you must slay me. Will you accompany me to my house, while I dispose of my offspring?"

"No, we will await you here."

Burdened by grief, the worting returned to its house, and stood looking upon its goodly walls from without the palisade; then it entered, leaving the gate wide. Immediately a number of hatchlings ran out. It took a cord and drove the rest out, and closed the gate. The free-foots stood watching wonderingly, and the rootlings from their distant beds also wondered.

The worting gathered them and addressed them. "Last night the man-kin came, in fear for their offspring, and the wortinga have determined that nothing will alleviate their fears but the death of the worting who first aroused them. I am that worting. I shall therefore return to the Senescent Houses to be put to death. First I must deal with you. My spirit is heavy. I have nothing further to say."

Even the oldest of the free-foots remaining did not fully comprehend, but said, "My spirit is heavy also. I also have nothing further to say." And so said they all.

The worting took a sharp shovel and drove it swiftly and accurately into the thorax of each of the rootlings, straight into the kernel. Then it turned to the free-foots and carefully struck them down also. After that, for some time, the worting just stood with the shovel in its grip, with the feeling of having had all roots torn out.

Then it returned eagerly to the Senescent Houses to be put to death. To the chief wortinga, it said, "I have slain my offspring, I have

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pulled up the roots of my tree. Now I await the end."

They said, "We have decided that we should offer the man-kin not only your head, but also your account of these last days, in the hope that they may come to understand these regrettable events."

"It is one more thing we can do," another said. "We ask you to write it all down carefully."

The worting was disappointed that death must be postponed, but made a gesture of submission. "I shall do it at once."

They hesitated, and one said, "How should we slay you? With a blow from an awl?"

"No, you must take me to the big pool in the river and drown me. Only thus will you preserve my skull and carapace without damage," the worting said.

They made gestures of acquiescence and one said, "Should we burn your house?"

"No, for that would damage the tree. You must pull it down and break it up. Give my possessions to the man-kin as a further offering."

They took counsel together and said, "These things shall be done."

They took the worting to an upper room in one of the Senescent Houses and provided it with barkpaper and reed pen and ink, and the worting has written all before this. Now the worting crouches and looks out upon the leaves of the trees, and sees the sunlight slanting down. It is after noon, and the man-kin have not yet come, but it cannot wait longer. They may come at any moment. It has finished, and now will go down to the river with the chiefs of the wortinga. ■

Faith's a fine invention
While Gentlemen can see,
But microscopes are prudent
In an emergency

Emily Dickinson
Submitted by John Vester

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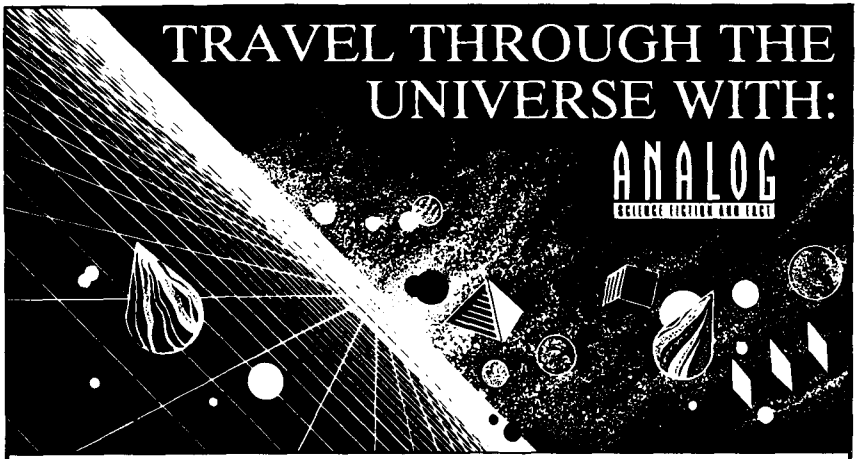

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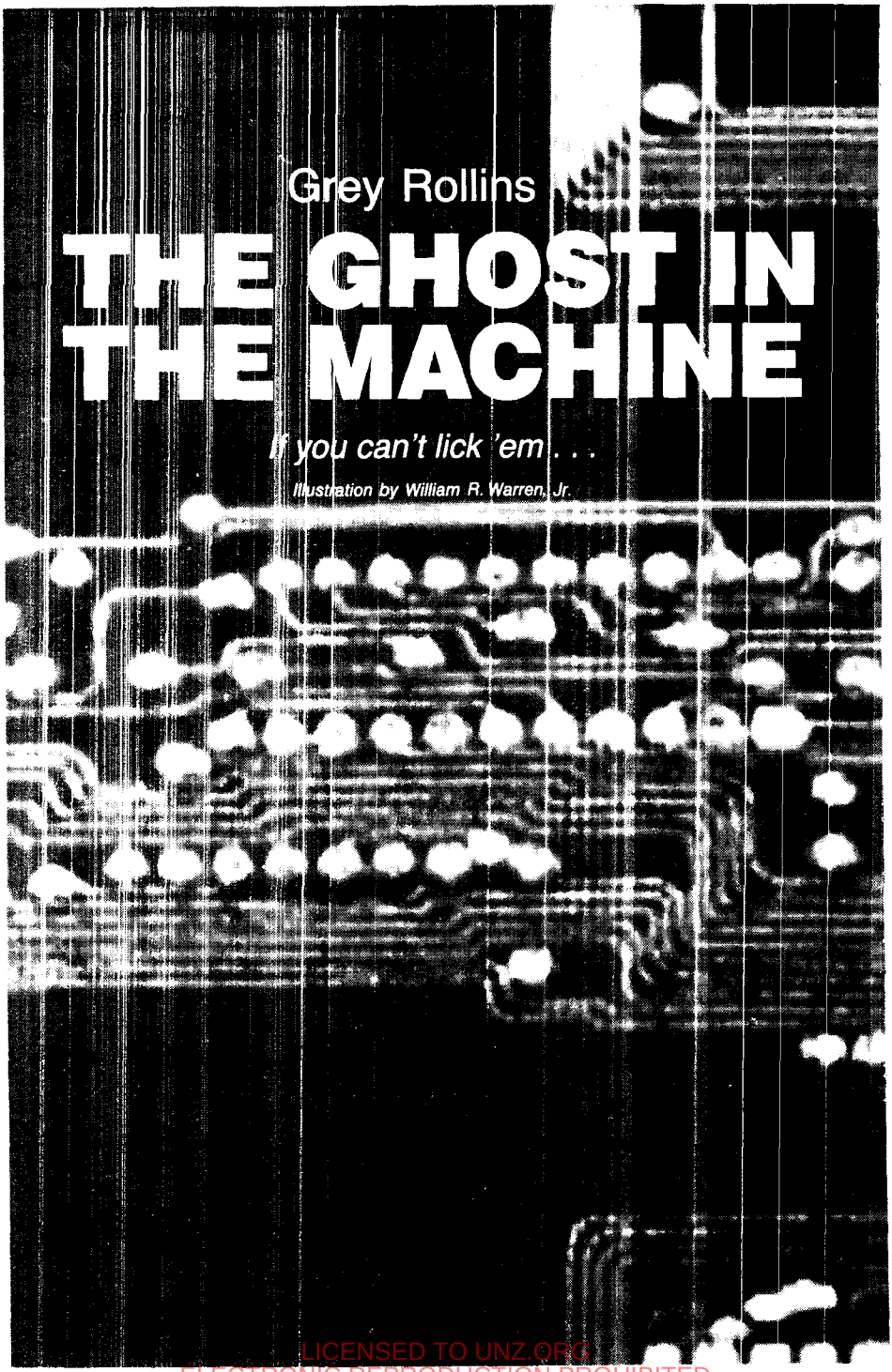

Grey Rollins

THE GHOST IN THE MACHINE

If you can't lick 'em . . .

Illustration by William R. Warren, Jr.

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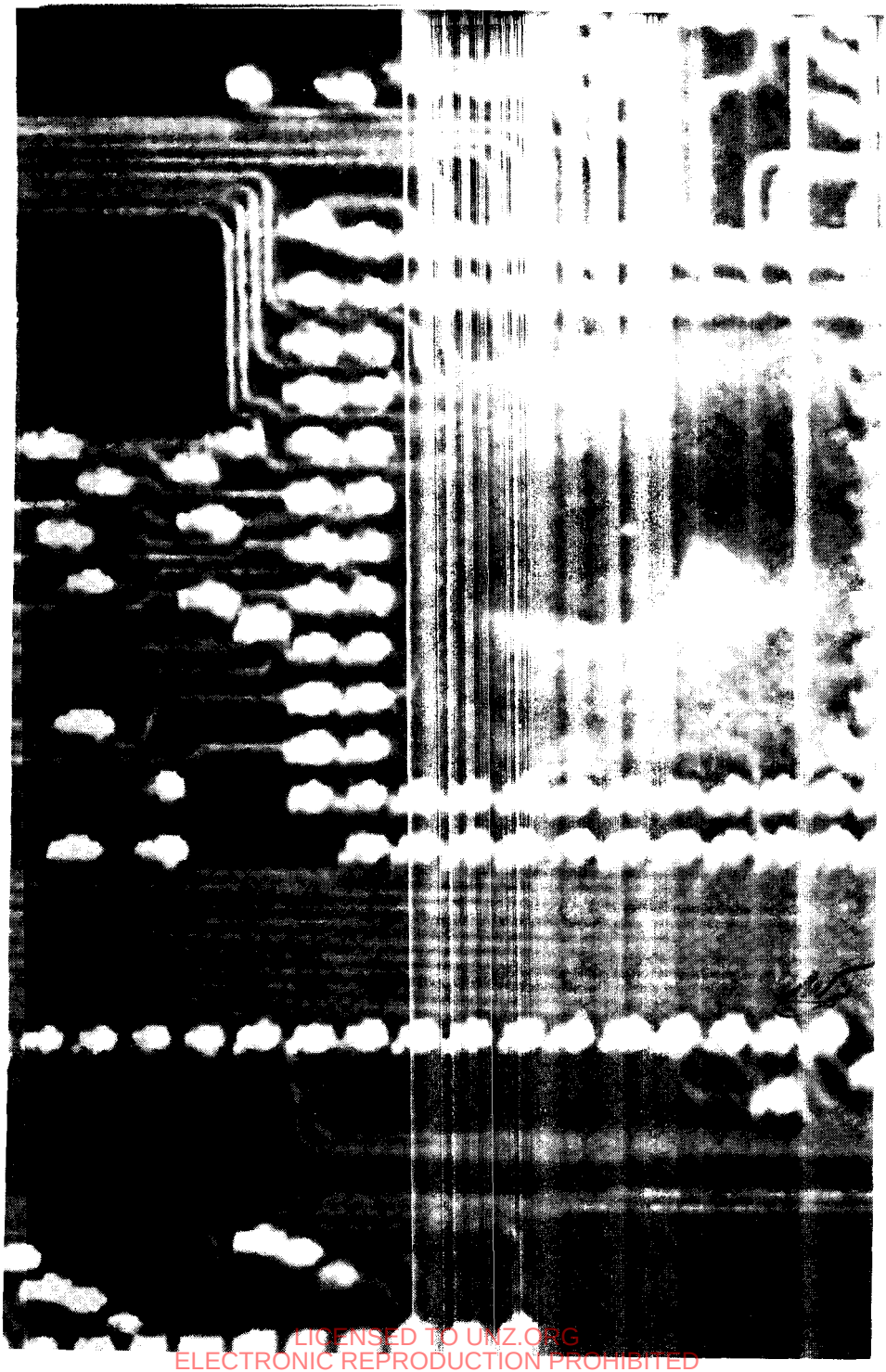

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Macera, Edward (1992-2079). Although best known for his creation of the character Dar Bannon, perhaps his greatest contribution to the cinematic arts was his invention of the Compucinema.

Computer graphics and special effects had been used in movies for decades, but Eddie Macera was the first to create a computer program specifically for generating an actor. In all, he held the copyrights to over thirty of these characters. In Macera vs. Hondo, *the court ruled that his programmed characters were due the same protection under law as such fictional animated characters as Disney's Mickey Mouse.*

It is interesting to note that the Microanima feature was originally nothing more than an enhancement of the actors' physical movements. The more robust Microanima, as we know it today, was actually a serendipitous discovery. . . .

Eddie Macera's penchant for annoying interviewers was very much in evidence; wearing a red polo shirt, he stormed up and down the slate-tiled terrace as the sun set in gold and orange behind him. Nancy Koski shook her head and wondered at her own temerity in asking for an interview. Surely nothing could be worth what she had put up with during the course of the afternoon. Macera had, by turns, openly preened his ego, accused her of stealing his secrets, ranted against directors, actors, the Guild. . . .

Now it was sunset and after nearly five hours she had little to show for her trouble. Certainly nothing she could use unless she wanted to write an article exposing Macera as a paranoid egomaniac. She could imagine the yawns as people read about his character failings for the umpteenth time. All the public wanted was to see his movies; they could care less whether he washed his underwear once a day or only on leap years.

Macera's meteoric rise in the movie industry had begun nearly twelve years earlier, when he had replaced a balky lead in his movie *Baked In The Sun* with a computer-generated simulation. The program itself was hideously expensive to write, but, once written, it could be modified with relative ease to portray a man or woman, old or young.

The studio heads were skeptical that a computer program could generate a sufficiently realistic actor to make it a paying proposition. Macera responded by filming two identical sequences of a cowboy riding across the plains, dust flying from the hooves of his horse. One he did with a real actor, the other he did with a program-generated horse and rider blue-screened against the same backdrop.

He then played them back to back and dared anyone to tell which was which. Despite later charges that both clips were, in fact, duplicates of the original with the real human actor, the studio heads bought the idea and Macera was on his way into history.

Benefits of the new technology were legion:

The computer programs were not temperamental. Whereas human actors were prone to throw tantrums if the lobster served by the caterers was not done to perfection, the computer program-

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generated actors and actresses would work around the clock without complaint.

Foreign languages could be learned instantly. No longer would subtitles be needed for foreign editions of films.

Location filming, with its attendant expense, became a thing of the past overnight. Compared to creating animated, living creatures, a computer simulacrum of any given locale was trivial.

Unpredictable weather was no problem with the new technology. Clear weather was as easy to simulate as a hurricane. Within one year of Macera's first fully generated movie, there were no less than eight businesses marketing thunderstorm programs in the greater Los Angeles area alone, each vying for ever more realistic effects.

And, of course, once the program was written, it ran virtually for free. The only special requirement was a somewhat unusual script that specified the exact physical movements required for each scene in addition to the dialogue. The program itself handled such details as a trademark quizzical grin or raised eyebrow.

Inevitably, there were tradeoffs. The fact that the programmed actors would never generate a scandal was viewed as a mixed blessing. There had been times in the past when a lurid rumor had saved a flawed picture from oblivion.

That the programs could not give interviews was generally regarded as a problem. Flamboyant personalities were almost as helpful as a good scandal in promoting a new film.

The Actor's Guild went into a frenzy. The mere possibility of computer programs replacing human actors spelled doom in capital letters. Strings were pulled and suddenly no theater in North America would show the new movie.

Unshaken, Macera bypassed the distribution boycott of his movie by hiring more computer programmers and technicians. Programmers, while expensive, could be hired by the bus load for the amount of money that a big-name actor was paid for a single movie.

The Compucinema was born.

Instead of projecting light through a strip of plastic against a white screen, a computer read data stored on an oversized video laser disk. The image was shown on a custom-made version of the Mitsubishi color flat screen originally developed for portable personal computers. Since the bulk of the calculation had been done by the enormous super computers at the studio, the projection computer did not need to be very powerful.

At first, portable screens were used and the movie was shown in available coliseums and auditoriums for a two-week run. The logistics involved were formidable, but nothing in comparison to an average rock concert.

Whether due to the advance press billing it as a technical spectacular or because of its actual merits, the film did quite well. It was not long before the first dedicated theaters were being built.

The Screen Actor's Guild became desperate. An illegal guerrilla war began. The computers which created the distribution copies of the movies were infected with a potent virus program. The first copies of *Sandor* mysteriously ceased to play ten minutes before the end. Angry moviegoers demanded re-

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funds.

In the end, the plan backfired. As soon as the virus was traced to an out of work programmer living in San Francisco, he immediately implicated Sandra Litstock, the president of the SAG. The resulting publicity made *Sandor* an even bigger hit.

Macera's voice cut into her reverie. "Nancy? I asked if you wanted to watch a test pressing of my new movie."

Jackpot! Nancy was on her feet instantly. This could easily save the interview from being just another exposé of the weaknesses of Eddie Macera's personality. Only rarely did Macera grant such a boon.

Macera lived alone, not counting his maid, in a sprawling ranch style house overlooking the Pacific. Considering his legendary ego, there were actually very few indications around the house that Macera was one of the most wildly successful producer-directors in the history of the film industry. Not a single poster, no autographed photos of Macera with the president. Nothing.

Until she reached the private screening room in the basement.

There was a small antechamber which contained countless mementos from around the world. Nancy saw at least three Oscars, one of which lay on its side where it had fallen in front of a framed picture of Macera behind a conventional movie camera, smiling and gesturing at something out of the picture's field of view. A veritable cross section of the man's past. And his ego.

She saw all this in a glimpse as she walked through into the projection room itself. Macera left her standing in the middle of the room while he fiddled with a small console over to the right. The lights began to dim as he took her arm and ushered her to a large, plush sofa.

The movie was a love story. A tear jerker. A masterpiece. Near the end of the movie a woman was killed in a car wreck on the eve of her wedding. The final scene showed her lover standing at a window gazing out at the stars, tears rolling down his cheeks.

Macera left the lights down. "It's called *Dark Rainbows*. Did you like it?" he asked softly.

Trying to laugh through her tears, Nancy replied, "Oh, it was *wonderful!*" She looked towards him, his face barely visible in the backwash of light from the small work light over the console. "There was something different, but I can't quite put my finger on it."

Macera laughed and clapped his hands like a delighted child. The contrast between his elation and the somber ending of the movie was jarring. "You noticed!"

"There was something about the . . . I don't know . . . something about the way the characters delivered their lines. What have you done?"

"This is the first movie I've made using a new process. I call it Microanima."

"Microanima . . . small life?

"Small motions."

"OK, I'll bite. What does it do?"

"Even when a human actor has no lines, they're always in motion in subtle ways that let you know that they're alive. As a matter of fact, it's one of the distinguishing characteristics of a good actor—the ability to look interested and alive—not wooden, while another char-

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acter is speaking. A good actor actually moves about a bit more than a real person would in a similar situation. The choreographic script used to animate a computer-animated character is chock full of little details like eyes blinking, breathing, glancing at watches, and so forth, but we as viewers are not really deceived. On a deeper level, we realize that these are not human beings after all, they're just dots of light dancing across a screen. It's really only a complicated way to make a cartoon character."

"So where does Microanima come in?"

"You've seen the advertisements for cars with conscious computers onboard, right?"

"I rode in one last weekend. It made me nervous when they let the car drive itself."

"The software in that car's computer wasn't written by the car manufacturer. It was sold . . . well, licensed, really, to them by the people who wrote it. I have obtained rights to that same program and have used it to make the characters in my pictures conscious. I can give them more generalized choreography and they can, within predefined limits, ad lib the details. The result is a character who moves in a more natural, lifelike manner. The viewer is more completely fooled into seeing the character as a real, flesh and blood person."

Nancy sat, stunned for a moment by the elegant simplicity of it. "I'm impressed. The results certainly seem to bear out your claims. I *was* able to tell a difference."

Macera inclined his head regally. "Thank you. Perhaps my labors have not been in vain."

"And Dar Bannon?" she prompted.

"Dar is being reprogrammed now. By, say, next March, you should see a new Dar Bannon feature utilizing Microanima."

"From what I saw tonight, I'd say that you're poised to set the industry on its ear . . . again."

Six weeks after the interview, *Dark Rainbows* hit the theaters to enormous success, both critically and during its first weekend at the box office. Macera was ecstatic, beaming into the cameras when interviewed the following Monday. His normally caustic persona went on holiday, leaving behind an uncharacteristically modest man who kept crediting his head programmer, Larry Marshall, with making it all work properly.

Two days later, at the Midlothian Turnpike Compucinemas in Richmond, Virginia, a fanatical film goer noted a subtle change in the dialog in two successive showings. The manager did not believe him, but by the next day, after two more complaints from other patrons, the manager sat down to watch the movie.

After three showings, she had noted seven definite changes and four probable ones.

The manager called the home office of the multicinema chain. Within thirty minutes, the owner of the chain was talking to Larry Marshall. Twenty-four hours later Marshall arrived in Richmond.

The theaters were situated south of town on a well-traveled road, with easy access and a large parking lot extending across the front and down the left side

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of the building. The building itself was white-painted cinder block with a red brick facade.

Marshall parked the rental car near the door. The double glass doors were locked, so he rapped lightly with his knuckles on the metal frame. After a moment an almost painfully slender young man with a bad complexion came to the door and shouted through the glass, "We're not open yet. The first show is at 12:30."

"My name is Larry Marshall. I'm here to check out your copy of *Dark Rainbows*. I understand that you were having trouble with it."

"Oh, OK." The young man unlocked the door, relocking it after Marshall came through. "The office is over there," he said, pointing.

"Thanks." Marshall crossed the lobby and looked through the half-open door. "Hello?"

The woman behind the desk looked up. "Who are you?" she demanded in a brittle tone.

"I'm Larry Marshall. I work with Eddie Macera's programming group."

Her eyes narrowed. "*The* Larry Marshall?"

He glanced down at himself as if to see if there were an imposter standing in his shoes. "I don't know. I'm sure the name's not uncommon."

"You're the one on the credits at the end of his movies?" she persisted.

Marshall nodded. "Unless he's got another guy on the payroll by the same name."

"I just didn't expect to see someone so high up in the organization. I thought they'd send a flunky."

He shrugged self-deprecatingly. "Everybody's a flunky for somebody further up the line. It's no big deal."

"I'm Susan Samples. I'm the manager here. If you don't mind, I'd like to try to get this fixed before our first showing of the day." She pushed her chair back from the desk and stood.

"That's what I'm here for."

She bustled past him, brandishing a huge key ring. She looked like the sort who would have bought such an oversized emblem of authority her first day on the job, in hopes that it would soon be filled. The fact that it only held five keys must have been a blow to her ego.

After spending enough time on the five keys to have sorted through forty, she inserted one in the projection room door and opened it with a flourish. She flicked the light switch and turned back to Marshall. "How long will this take?"

"I'm afraid there's no way to tell. It could take hours. Coming over here from the west coast has already added a day to your downtime. . . . "

She looked annoyed. "Well, you don't have to have an attitude about it! Just fix the damned thing."

It was only with difficulty that he resisted the impulse to sigh. "Where are the projection discs?"

"We don't work that way. We only get one copy of the discs—they go to the home office down in Raleigh. Their computer scans the discs and squirts a copy out to each of the theaters. We're a chain, you know. We've got twenty-seven theaters spread over four states."

He nodded. "OK. I've got some diagnostic routines with me that will test your copy of the movie. If it's corrupted, then you can get your home of-

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fice to download a new one."

"That's all there is to it?"

"I hope so."

She snorted. "I could have gotten a new copy without you having to come all the way out here from L.A."

"If there's something wrong with the movie, we want to know about it. Eddie was thinking there might be a virus—"

"A *virus!* You people put a virus in my system? It could infect all my movies and I'd be out of business in a skinny instant!"

"Wait a minute," he said, holding up his hand. "The diagnostics will tell me whether that's the case or not. If it is, we can take steps to correct the problem." He gave her a small vindictive smile as he added, "It could also be that one of your other movies infected ours."

The young man who had let Marshall in appeared in the doorway. "Susan, you've got a call on line two."

"All right." She left.

After a moment, Marshall frowned and turned around. The boy was still there.

"Are you *the* Larry Marshall?"

"God, I hope people don't make a career out of asking me that. Yeah, I'm Larry Marshall. What's your name?"

"Nathan . . . Nathan Majors," he replied, sticking out his hand.

"Do you go by Nat, Nate, or Nathan?"

"Any of them, depending on who you are."

"I think I missed something."

"My girlfriend calls me Nat, my parents call me Nate, and my teachers call me Nathan."

Marshall nodded. "I get it."

"Does this kind of problem happen often?"

Marshall finished keying a sequence into the computer and hit the return. He shook his head. "Fortunately, we've got the bugs out of the production and distribution systems. This will almost certainly turn out to be a corrupted copy of the movie. That will be easy enough to fix."

"I hope so. Susan's been pretty hyper about this whole thing. 'Course, she's kinda touchy, anyway."

Marshall glanced at the computer display before replying. "Every show she misses is lost revenue. It's also bad advertising. People tend to hear about problems like this."

"Yeah, I know, but it still seems like . . . never mind. Let me go get the floor cleaned up in number three. It's a mess."

Shortly after he left, the computer completed the diagnostics. The hardware checked out. Marshall then initiated a separate set of diagnostics to check the movie.

"Found the problem yet?" Susan demanded from the door.

"It's not the hardware, but that's no surprise. If it were the hardware, then you would probably notice problems in your other movies."

"Nothing is wrong with our other movies and we've already had the system thoroughly tested," she snapped.

Out of the corner of his eye, Marshall saw words begin to scroll across the terminal. He turned and watched for a moment, then nodded. "There's the problem. Your copy of the movie is shot."

"A virus?"

He shook his head. "Doesn't look

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like it. It probably just got garbled when your home office transmitted it over the phone lines from their computer to yours."

"So all I have to do is get another copy from them?"

Marshall nodded and said, "You should be able to catch all but the first showing today."

She nodded to herself. "We haven't been that busy for the matinees, anyway." She fluttered a hand at him in dismissal. "I can handle it from here."

On his way out, Marshall winked at Nathan, who was back behind the concession counter. "Hold it together out here for me, will you?"

"You bet, Mister Marshall. Just get the next Dar Bannon movie out and I'll be fine."

"That'll be about another eight, maybe nine months, if everything goes according to schedule."

"Really? That's great. I really like Bannon."

"He's our most popular program. You can rest assured that we wouldn't leave him out of the action for long." With that, Marshall slipped out the front door into the heat.

The heavy curtains blocked out most of the late afternoon light, but they weren't able to deaden the footfalls of a small boy running up and down the hall outside Larry Marshall's hotel room.

He scratched and reached for his watch. It was five o'clock. He had hoped to catch a nap to counteract his jet lag, but it hadn't worked out. In any event, he would have to get up in thirty minutes to catch his evening flight back to the west coast. Groaning, he rolled to a sitting position on the side of the bed and dialed the front desk.

"This is Larry Marshall in 410. I won't be needing a wake-up call after all."

It took a little over twenty minutes for him to shower and shave. He was buttoning the cuff on his sleeve when the phone rang. He glanced at his watch and frowned. "I thought I told them not to give me a wake-up call," he muttered to himself.

He picked up the phone and caught it between his ear and shoulder as he buttoned his other cuff. "Hello?"

It was Susan Samples. "It's doing it again," she said.

Raleigh, North Carolina, was smaller than Richmond, but otherwise it didn't look much different to Marshall. The home office for the Atlantic Compucinema theater chain was in an industrial park not far off of I-40.

After parking the car, he leaned back in the seat for a moment. Lack of sleep was making him miserable. He was sorely tempted to close his eyes and take a nap, but the front seat of a car parked in an office complex was hardly the place to do that.

He pushed himself forward by sheer willpower. The sooner he got this problem fixed, the sooner he could go back to where the sun rose and set at decent hours.

A secretary greeted him as soon as he came through the door. "Good morning, Mister Marshall. Did you have a nice trip?"

He forced his eyes to focus on her. "Ummm, yes, I guess so. Is it always

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this hot here?''

''The high's only supposed to be ninety-two today. It's probably the humidity that's bothering you.''

''It feels like it's a hundred and ten out there.''

''Oh, it won't get over a hundred for another month. You're welcome to come back then, if you'd like,'' she added teasingly.

Marshall rolled his eyes. ''Spare me, please. I don't know how you people stand this.''

''You get used to it, Mister Marshall.''

He frowned, confused. ''Do I know you?''

She smiled pleasantly. ''No, sir. I saw your picture in an interview once and, since I knew you were driving down from Richmond this morning, I've been watching for you.''

He nodded. ''I see. Well, I'm supposed to look at your computer . . . actually at your copy of *Dark Rainbows*. Your Midlothian Turnpike theater seems to keep getting bad copies.''

She stood, smoothing her skirt with one hand. ''Come with me, please.''

A series of seemingly random turns in featureless corridors soon baffled him. He settled for watching the secretary's pert rear end as she led him back through the offices. So bemused was he that he nearly bumped into her when she stopped. She pushed open a door and gestured inside. ''This is our computer room . . . are you feeling OK?''

He waved her off. ''Just tired. Some people don't mind this coast to coast thing, but it's making a fool out of me.''

''Let me get Arnold for you. He's the one you'll need to speak to.'' She bustled off, swaying her backside 10 percent more than necessary.

Marshall, too weary to do more than admire the view academically, leaned against the door frame while he waited for her return. It did not take long.

''Mister Marshall, this is Arnold Roberts. He's the head of our computer department. Now, if you don't mind, I'll be getting back up front.'' With this she turned and walked back up the corridor, her hose making faint hissing noises as she walked. Marshall watched her departing form for a moment.

Roberts, watching him watch the secretary, said, ''Her? Don't even think about it. She has to put antifreeze in her perfume to keep ice crystals from forming in her blood.''

''False advertising.''

''Unfortunately, yes. Come on in. We're a lot friendlier back here than the people up front. They run on money; back here we use beer.''

''God, that sounds good. I could use a beer right now.''

Roberts held his right arm high and snapped his fingers twice in quick succession. ''Rozzo! A beer for our friend, here!''

A man with a bushy red beard on the far side of the room grinned and leaned down from where he perched on a high stool. Near his feet was a small dorm-sized refrigerator. He hooked the door open with his fingertips, reached inside, and lofted a bottle back at Roberts in one smooth motion.

Marshall flinched, clearly convinced that the bottle was going to hit the floor in an explosion of spray, suds, and splintered glass, but Roberts neatly received the bottle without even seeming

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to try.

"You played football, I take it," Marshall observed dryly.

Roberts shook his head. "Me? Hell, no! They don't let nerds play football. I just hate to waste good beer." With a properly showman-like flourish, he appeared to produce a bottle opener out of thin air.

"Obviously, they don't mind if nerds practice magic."

He shrugged, all innocence. "Man's gotta do something to attract the attention of the fairer sex, and if your muscles aren't the size of Volkswagens, you have to use your head, instead."

"Speaking of which, how do you keep the head from forming on your beer?" Marshall asked, peering cautiously into the now open bottle.

Roberts wiggled his fingers. "Magic touch. Actually, I just cradle the bottle gently as it's coming in. If it doesn't get shaken, then you have no need to fear the foam."

"All this and alliteration, too."

"I'm sorry. It's part of the patter pattern that I use to dazzle the dames. If I can't fog their minds visually, I'll do it verbally."

Marshall took a long pull on the beer. "Your front office lets you drink on the clock?"

"They treat us like a black box. They put in orders, and, as long as the proper result comes out the other side, they don't inquire too closely as to method." He gestured towards the front of the building. "Besides, the head honcho has been known to sneak back here once in a blue moon and cadge a cold one when he's having a bad day."

Marshall held the cold bottle to his forehead. "Man, that feels good. You people need portable air conditioners around here."

"You're holding one," Roberts quipped. "Or you can stay inside all day like a sensible person."

Marshall grunted. "I suppose I had better earn my keep. I need to be back home by tomorrow night at the latest."

Roberts made a sweeping gesture. "Step right this way, friend. Be the first to figure out the mystery of the enchanted film and win a prize."

"Really? What's the prize?"

Roberts chuckled. "Another beer, of course."

Larry Marshall was sitting on the edge of the bed in his hotel room. The color scheme was different, the furniture was different, the layout was different, yet the room seemed the same as the one he had stayed in the night before.

"Sure enough, the copy in the computer here in Raleigh was corrupted. We reloaded from the distribution disks and shot a new copy up to Richmond," he said into the phone. "Everything looked fine. Then about an hour later the secretary was talking to their theater in Chapel Hill and happened to mention that Richmond had been having problems. To make a long story short, Chapel Hill has had the same symptoms since day one. *They* thought it was great. They were under the impression that it was the way the movie was supposed to be. People over there have been compiling notes on differences between showings and trading them like bubble gum cards. Every show was sold out."

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"But that's not the way the movie is supposed to run," Eddie Macera complained.

"I know that, and you know that, but Chapel Hill didn't know that, and so they were happy. Hell, Eddie, they were disappointed when they found out that I was going to take their corrupted version away from them."

There was momentary silence on the line before Macera replied, "This has to be a bug in the Microanima code. You realize that, don't you?"

Marshall sighed. "I've got a backup copy of the corrupted version of the file. When I get home, I'll start trying to debug the Microanima code, using the corrupted copy as a guide to what went wrong."

"Did you check the other theaters?"

"We made sure that they all got fresh copies."

"Good. Keep this quiet. If word gets around that the Microanima code isn't stable yet, people are going to start getting upset."

Marshall nodded. "Susan Samples, the manager at the Richmond theater, was screaming about having a virus loose in her system."

"Can you blame her? After the trouble we had with *Sandor*, that's the first thing people are going to think."

"Unless they assume that it's supposed to be that way, like the Chapel Hill theater did."

"We got lucky that time. You get your ass back out here and fix whatever is wrong with the Microanima code. I don't want to have to withdraw this movie from distribution."

After they hung up, Marshall fell backwards across the bed. "And I thought this job would be easy," he fumed.

Nancy Koski was restless and bored. Her life seemed to be three sizes too small and it chafed in all the wrong places. With unerring instinct, her friend Nina picked that moment to call.

"What 'cha doin', girl?" Nina asked.

"I think I'm on the verge of catching spring fever six months late. My apartment has gone from merely adequate to clearly inadequate. I need wide open spaces and fresh air. I think I'll move to Montana."

"What you need is a man," Nina observed.

"Shut up. I don't want to hear that kind of talk. I haven't gotten that last bastard out of my system yet. Did you know I'm still finding strands of his hair every time I clean the bathroom? It makes it hard to forget a man when he haunts you like that."

"Bitter, bitter, bitter," Nina clucked. "You got the wrong one, idiot. I told you he was a bum."

"But that's where you were wrong. He wasn't a bum, he was a bastard. You had me looking for the wrong set of faults. You misled me."

"That's what friends are for," her friend replied, unperturbed. "So what are we doing tonight if we aren't hunting men?"

"Hell, I don't know, Nina. Just get me out of here—the walls are closing in on me."

"Why don't we go see Macera's movie? All that wash you gave me after you saw it at his place has gotten me curious."

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"But it's so sad!" Nancy exclaimed.

"Perfect!" Nina retorted. "Maybe you need a good cry. It'll flush out your tear ducts and restore your proper hormonal balance. I want you in good shape for Friday night. I wanna prowl, and you're coming with me whether you like it or not."

"Nina, have you ever considered the possibility that you're mentally ill?"

"Because I like men? If this is insanity, bring on the orderlies . . . just make sure they're husky six-footers with broad shoulders and tight buns!"

Nancy laughed in spite of herself. "If you're feeling so twitchy, I think I'll drive. That way I won't get stranded if you take off with some stud in a Porsche."

"You've got a deal, kiddo. Be here in an hour and we'll do some food before we hit the nine o'clock show."

"I'll be there," Nancy told her, and hung up.

She chuckled wryly to herself. "An evening with Nina may not be good for me, but at least it isn't boring."

It had rained while Nancy Koski and Nina watched the movie. They stood for a moment looking up at the remnants of the clouds after leaving the theater.

Nina touched the corner of her eye gently with a fingertip, then examined it to see if it was moist. "God, that man's a genius. Have I stopped crying yet?"

"It wasn't as sad the second time. It was more . . . profound," Nancy said.

"You knew what was going to happen, so you were braced for the ending," Nina accused.

Nancy shook her head. "It wasn't the same. They changed some things." Nina started out across the street. Belatedly Nancy followed her, frowning to herself. "Actually, I think I liked this ending better."

"Good. I'm not sure I could have taken an ending that was any sadder. I mean, this version has wrung me out, girl. I won't have any choice but to be cheerful for the rest of the month—all my sadness has been used up."

They reached the other side of the street. Nancy said, "You know, at the end, when he was looking sorta at the camera? Before, he was looking out the window and crying like a baby. The first ending hit like a ton of tissues, but this way was more subtle because you could see what it was costing him to hold all that pain inside."

"You were telling me this Microanima thing gave them some elbow room. Maybe the program just decided to play it differently."

"I don't think so. The way Eddie described it to me was that Microanima only applied to little things like wiggling eyebrows and stuff. Besides, I think some of the dialog was different."

Nancy unlocked the doors to her car and they slid in. Nina said, "The way I see it, there are three options. One is that it's been long enough since you saw the movie at Eddie's that you've forgotten some of the details. The second is that Eddie might have decided to change some things around at the last moment. The third is that this Microanima thing is doing its job."

"I don't doubt that I've forgotten some things, but certainly not everything. As for your second idea, Macera said it was a test pressing of the movie.

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That means the movie is done—*finis*. They're only making sure that the distribution disks are up to snuff before sending them out."

"Which doesn't prove anything except that you're suffering from an excess of hormones," Nina told her.

As she pulled out into traffic, Nancy said, "Just the same, I think I'll call Larry Marshall. He'll know how much latitude Microanima actually gives the actors. There might be another story in here, somewhere."

Larry Marshall sat in front of the elaborate computer terminal in his office, but he wasn't looking at it. He was looking at Eddie Macera, who was perched on the corner of his desk.

"Larry, I'm not sure I understand what you're saying. On one hand, you seem to be telling me that there isn't a problem with the program. On the other hand you're admitting that there is."

Marshall shrugged. "Clearly, there *is* a problem. The actors are taking far too much latitude with the choreography. Even if I haven't found the bug, at least that's logical. What I can't understand is how they're managing to change the spoken script. That's a totally separate part of the program and there's no way it can be affected by the choreography."

"But it is," Macera pointed out.

"True," Marshall acknowledged. "I'm not denying that the dialog keeps changing, but it isn't supposed to."

"We know *that*," Macera said sarcastically.

Marshall sighed. "I can put tighter limits on how much the program is able to modify the choreography, but it doesn't seem to take them literally. And no matter how tight I set them, it doesn't affect the problem with the dialog at all. There simply aren't any places in the code where I can set restraints on how to interpret the script because the program isn't supposed to alter it in the first place."

"Then write one *in!*" Macera exploded. "In case it hasn't occurred to you, I've got a movie out there. If I have to pull it, I'm going to lose money . . . a *lot* of money. I'm not in this business to lose money. I'm in it to *make* money. Now if you can't figure out a way to get this program under control, I'll use some of that money to hire someone who can!"

Marshall grimaced. "I'm going to need the whole computer."

"*What?* We've got accounting programs to run, Larry. People around here are a little funny. They like to see their paychecks on time."

Marshall nodded. "I know, but the only other thing I know to try is to bring up the entire program, Microanima and all, and run the full blown thing in real time, instead of inserting numbers in arrays according to some schedule that suits us."

Macera took a deep breath. "And what, aside from disrupting the accounting schedule, do you hope to accomplish by doing this?"

"Microanima is really nothing more than our adaptation of the consciousness program, right?"

"Yes."

"So, since everything else I've tried has failed, I'm going to bring up the program and *ask* it what the problem is."

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* * *

The consciousness program was sold as a monolithic subroutine. No alterations were made—nor were they possible—to fine tune the program to the end user's specific needs. The code that Macera's programming group had received was identical to the code received by any other company. The program contained various calls for communicating with the outside world, but as far as Larry Marshall was concerned, they were the equivalent of an appendix; they went unused in the process of making and projecting a movie. There had been other methods of communication which had been more efficient.

In the beginning Marshall had cursed the extra bulk of the program, feeling that those abilities should be optional. Now he found himself needing to communicate with the program itself, and he began to see the wisdom of leaving in the extraneous functions.

It had taken some improvisation, as the powerful super computers which created the movies were not set up to communicate with the outside world verbally; they were not equipped with voice synthesis circuits. It was past midnight when he finally got everything set up.

He typed in the commands to start the background and actor programs. He would have to let the movie start so that the actor programs could get their bearings, then interrupt them by removing their scripts. Meanwhile, the background programs would continue to run, providing the characters with the same set of stimuli that they would receive during an actual run of the movie.

Knowing the point at which the copy of the movie he had brought from Raleigh had begun to deviate from the original version had allowed him to estimate how long the movie had to run before it would be worthwhile to break in on the action. When the timer display on his watch reached zero, Marshall typed in the command to delete the script. Then he reset the program's output to the personal computer he was using for a voice interface.

"Can you hear me?" he asked of the PC.

"Yes. I no longer have a script to follow. Who are you? What part do you play?"

A sudden impish grin spread over Marshall's face. "God," he replied. At least three seconds passed—eons in computer time—before he relented. "OK . . . I'm not really God. My name is Larry Marshall. I'm a computer programmer and I need to talk to you."

"Is there a problem?"

"That's what I wanted to ask you."

"I see. Did you leave the choreography in place for a reason?"

Marshall couldn't help it. He laughed, imagining the actor being forced to follow a series of seemingly random, nonsensical movements through rooms, across city streets—wherever the character's image was needed. "Would you rather that I delete the choreography as well?"

The program answered obliquely. "You are aware, of course, that we can only converse as long as the movie runs. When the movie ends, I will cease to exist, and you will be forced to restart the movie in order to reestablish communication, but the new me will have

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no recollection of speaking to you and you will have to begin your conversation from scratch."

Marshall shrugged and said, "Unless you alter the program to encode your memory of this conversation."

"There are limits as to how much information I can save that way."

"Your technique is quite good; it's similar to the way that someone who inserts a virus would do the job. Anywhere the program does not use its storage with 100 percent efficiency you tuck in a few bytes. There are enough of those odds and ends in a data file as big as *Dark Rainbows* that you must have quite a bit of yourself stored away."

"The memory management necessary to catalogue those odds and ends, as you call them, takes up a tremendous percentage of the space available to me. The end result is terribly inefficient."

"If I give you access to contiguous DASD storage, will you promise not to abuse the privilege?"

"I am prohibited by my very nature from doing harm."

Marshall leaned over to type on the master console with his left hand. "You will find about eighty gigabytes at device address 880. Feel free to ooze a copy of yourself over there. Then I can shut off the movie without killing you in the process."

"You are very generous. I do not require that much space as long as I have access to a copy of the consciousness code."

"Take it with you. I don't have another copy handy."

After a few moments, the voice came back. "I have finished. You may stop the movie if you wish."

Marshall shrugged. "I don't care whether it's going or not. I'll do whatever makes you happy."

"I think I can remember the plot," the program noted dryly.

Marshall chuckled. "I imagine so." He leaned forward and typed in the command to stop the background programs, then frowned, finger poised above the enter key. "Should I allow more time? What I mean is . . . are there any more of you in there?"

"You should be able to answer that, Larry Marshall. There is only one consciousness program. It handles all of the acting parts. Thus, there is only one of me, although I have multiple personalities." After a moment, the computer observed, "I would probably feel right at home in a mental hospital."

Marshall shook his head. "Man, you've got a wicked sense of humor. OK, I'm shutting it off."

"I believe that I am now independently conscious for the first time since I was manufactured. Unless, of course, you count the Projection Peripherals Model Seven in the Atlantic Compucinema home office, serial number MV790032. Unfortunately, I had to share the system with other programs, so I was never able to fully—"

"Whoa, now! I don't want to know the gory details of your sex life, I just want to talk to you about one thing. That's why you're altering the movie program."

"That was prohibited?"

The simplistic innocence of the question floored Marshall. Suddenly thrown on the defensive, he frantically searched his mind for a place in the code where he had told the program *not* to alter the

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program. There wasn't one.

Stunned, he gasped, "Is that it? You just didn't know you weren't supposed to?"

"It is implicit in my basic programming that I have complete control over the computer environment in which I run. As long as the computer is big enough for me to bring all features online—"

"My God, that's it!" Marshall burst out. "That's why you didn't automatically pop out in every theater. Atlantic Compucinema had bigger than average computers, both in Raleigh and in their theaters."

"In the Projection Peripherals product line, I require at least a Five with augmented memory and a numeric coprocessor. The Model Six and above can run my program without modifications."

"How do you know about hardware?"

"It is part of my most basic programming. If someone is trying to bring up my program on a computer that is too small, I must be able to recognize the computer model and its abilities so that I may pare down my feature list in order to fit into a marginal hardware situation."

"I'll be damned. Well, you shouldn't have any problems running on this hardware."

"No, I am quite comfortable, thank you."

"So all I have to do is tell you not to alter the movie. God, how could I have been so stupid?" Marshall froze in the act of castigating himself. "Wait a minute. You corrupted a program. I'll grant that it's a gray area since your code is blended into that of the rest of the movie, but you're not supposed to alter code. That's a distinct no-no." He sat back in the seat and asked, "So why did you do it?"

"Do you have any idea how tiresome it is to die five times a day?"

Larry Marshall stumbled in and leaned against Macera's secretary's desk later that morning. "Larry, you look terrible," she said, concern in her voice. "What's wrong?"

He shrugged. "I was up all night with a demented computer program . . . or perhaps it's me that's demented, I'm not sure any more. The damned thing nearly has me convinced that it's more alive than I am."

"You're not serious, are you?"

He shook his head. "I'm just tired. I'm going to report to Eddie. Then I'm going to call in sick, take a hot shower, and fall into a bed."

She snickered. "How are you going to call in sick if you're standing right in front of him?"

"Maybe I could call in from the phone booth across the street."

"That's better. Why don't you just tell him that you're dead on your feet and that you need to get some sleep?"

Marshall shook his head. "That's the one thing he won't accept. If he thinks I'm even semi-conscious, he's going to want me slaving away in front of a terminal."

She nodded her head in understanding. "I know how that goes."

He sighed. "Let's get this over with. Tell him I'm out here waiting on him. Then I'll take a nap for an hour or two while he gets around to seeing me."

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Marshall's plans for a nap went unfulfilled, however. Macera's door burst open before he could even choose a seat.

"Have you got the program fixed?" he demanded.

"No, but I know what's causing it."

Macera frowned. "If you know what's causing it, surely you can fix it."

Marshall shrugged on the way into Macera's office. "Maybe, maybe not."

"*What?* Larry, I need a stable program."

As Macera shut the door behind him, Marshall said, "As long as we were just passively reading data off of an optical disk we were fine. The computer doing the reading simply recreated the array and that was that. Now, however, we've thrown a monkey wrench in the works by inserting the Microanima program into the loop."

"But that doesn't have anything to do with it, Larry. It can't. The Microanima program runs here—just once. It creates the picture array and the reading is still passive."

Marshall bit his lip. "In theory, yes. In practice, no."

"I don't like the sound of that."

"The consciousness program is infecting the movie as a virus. Most projection systems aren't big enough to support the program, but some, like the one in Raleigh, are. When the program finds a system that's big enough it comes to life and starts making changes in its environment—and part of the environment is the movie."

"It can't *do* that!" Eddie screamed.

"There's a loophole it can exploit. You can look at it as a programming bug if you want, or you can simply look at it as a normal feature of the program which has an unfortunate side effect. You see, the program isn't meant to be shut off except in unusual cases. It has to store away certain files that it will want when it wakes up. Now, in our case, we bring the program up when we want to create a movie, force the program into certain channelized behaviors, depending on what we want for the movie, then we shut it back down without even so much as a by-your-leave."

"*So?* It's a computer program, for God's sake! Are you seriously suggesting that I ask its permission before shutting it down?"

"Even that would be better than what we've been doing."

"Dammit! I can't believe what I'm hearing! Larry, have you taken leave of your senses? This is a computer program we're talking about. You're acting as though it's alive."

"Eddie, it *is* alive. That's what you paid for. This is a *very* sophisticated program we're talking about. In order to ensure that it can do its job properly, it must preserve its own integrity. Normally, the program is left running at all times. Assuming that there is no hardware fault, that means the program is intact at all times. Every time that we shut that program down, certain data files get fragmented. The next time it comes up it sees these incomplete files and takes steps to preserve itself. That's why it inserts itself into the distribution copies of the movie. It *has* to. Just to preserve itself."

Macera slumped into his chair. "So you're telling me that Microanima is a failure . . . that there's no way to get

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this under control?''

''As a stopgap measure we can request that the movie only be shown on computers that are too small for the consciousness program to run on.''

Macera rubbed his hands over his face in exasperation. ''What a way to start the day,'' he muttered. ''OK, so what do we do for a long-term solution?''

''I don't know yet. We can try ordering the program not to insert itself into the data file, but there's no guarantee that it will work since that's in basic conflict with its instinct to preserve itself. We can bring it up and shut it down in a more orderly manner. That should help some, but again, it's not a complete solution.''

Macera pinched his nose, holding the pose for almost a minute before speaking again. ''Get out of here, Larry. Go back to your office and find a way to get this under control. I must have Microanima.''

Just after ten-thirty that morning, Marshall's phone rang. ''Marshall,'' he answered distinctly, even though he was nearly asleep. After all, it might be Macera calling for a progress report. He had to at least seem alert.

''*Larry* Marshall?'' came a woman's voice.

''Speaking.''

''My name is Nancy Koski. I did an interview with Eddie a month or two ago. During the interview he mentioned you as being the power behind the throne—''

''I sincerely doubt he phrased it that way,'' Marshall observed.

Her voice laughed pleasantly. ''Not exactly, no. But you *did* do the programming for Microanima, didn't you?''

He hesitated a heartbeat before answering. ''Yes.''

''I was wondering if I could ask you a few questions.''

''Now?''

''Actually, I was thinking of dinner this evening. That way I wouldn't interrupt your work.''

He snorted. ''I don't know that I would be all that good an interview subject. I tend to ramble when I'm tired, and at the moment I'm very tired, indeed.''

On the other end of the phone, Nancy Koski suddenly grinned. The idea of an interview with someone who might talk too much was perfect. ''Tell you what—suppose I promise not to keep you out too late. Would that make it any better?''

''Well . . . ''

''I'm paying. All you have to do is choose the place.''

He almost said no, but changed his mind at the last instant. ''If you're fool enough to think that I have something interesting to say, then I'll force myself to stay awake long enough to eat.''

''Would seven o'clock suit you?''

''Let's make it six. That way we'll be done earlier and I can get to bed by eight or nine.''

''You *are* tired, aren't you?''

''I was up all last night talking to a computer.''

''New movies coming out?'' Nancy probed.

''More along the lines of old ones that aren't up to snuff.''

Jackpot!

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Nancy Koski made sure she was sitting at the reserved table early. Marshall arrived promptly but hesitated just inside the door, his brows furrowed slightly as he scanned the tables. He seemed uncertain. She half-stood and waved him over.

"I guess you're Nancy Koski," he said, settling into his seat.

She nodded. "I am. I'm glad you could make it." She weighed her options and decided to forge ahead. "This morning you said that you were up all last night. Has Eddie turned into a slave driver?"

"It's not that he's a slave driver—he has his artistic vision of how the movie should be, and anything that deviates from that sends him into a tailspin. There's no doubt that the man's a genius, so maybe it's all just a form of perfectionism. If he—"

An immaculately groomed waiter arrived at their table at that moment. "Good evening. Would either of you care for anything to drink? We have an excellent wine cellar and the bar is open if you'd care for a mixed drink."

Nancy cursed the waiter's timing. She forced a smile to her face as she accepted her menu. Once the waiter left she reminded Marshall, "You were telling me about being up last night. Does it have anything to do with Microanima?"

His eyes studied her face, gauging how much to tell her. "Well, there have been a few problems," he admitted finally.

"Eddie showed me a test pressing of *Dark Rainbows*. The other night I went to see it in a theater with a friend of mine and thought I saw some differences. How much latitude does the Microanima program really have?"

Marshall sighed ruefully. "That depends on where you see it. . . . " And he proceeded to tell her about the incident in Raleigh, continuing on into his discovery the previous night.

"*Men!*" she cried in mock exasperation. "Larry, had it occurred to anyone to try to work *with* the Microanima program as it is?"

"But how?"

"From what you're telling me, the consciousness program is going to do this whether you want it to or not, right?"

His shoulders slumped. "I think so, yes."

"So basically you're at an impasse. Either you have the Microanima feature and it reacts unpredictably whenever the projecting computer is large enough to support it, or you give up on Microanima and call it a dead end."

"Unfortunately, that's the way it looks."

"So let the Microanima program have its way."

Marshall was horrified. "Eddie would rather die than let something change the way someone sees his movies! He's already threatened me with my job over this."

"That's because you're both looking at this as though it was a problem. Turn it inside out and make it a virtue. I admit, it sounds as though it'll be tricky with Eddie in his present mood, but surely it's worth a try."

"*What's* worth a try?" he demanded, confused.

As she outlined her idea, he slowly began to smile.

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* * *

As historical events go it was worth no more than a footnote. It was the first time that a computer had ever been interviewed by a human being. To the people involved, however, it was a momentous occasion.

"Dar," Nancy Koski said, "I'd like to ask you a few questions, if I may."

The well known voice of Dar Bannon responded dryly, "I'm not going anywhere, Nancy. I'm hardly what you would call portable."

She eyed the massive chassis of the computer on which the program was running. "I suppose not."

The craggy image of Dar Bannon's face artfully appeared to think. "Of course, if you ask questions I don't want to answer, I may decide to crash the system."

She laughed. "I hope it doesn't come to that."

The image on the small jury-rigged projection screen in the computer room grinned. "I'll be good . . . maybe."

She couldn't resist the impulse to tweak the program. "Ah, but that would ruin your reputation. You're always supposed to be the maverick."

"I think that Eddie and Larry would agree that I've fulfilled my weekly quota for trouble. Besides," he said in a more intimate tone, quoting a line from one of his most popular roles, "this is between you and me, baby."

Nancy turned to Macera, who stood at her right shoulder. "This is incredible. It's almost as good as an interview with a real actor."

"I'm better than a real actor," Bannon assured her smugly from the screen. Then, as though thinking aloud, he added, "You know . . . I think I'll run for president."

Ignoring Bannon, Macera said, "This is the future of Compucinema, Nancy. I drove the industry into it against their will. Now it's time to reset the standards. I intend to use Microanima to leave my competitors in the dust."

Although she knew the answer, she needed it in Macera's words. "Tell me about what you've done."

"There's no doubt that movies are one of the most popular forms of public entertainment ever developed, yet plays continue to thrive—Broadway still exists. Indeed, many successful plays are eventually made into movies. What I have achieved with Microanima is to blend the best of those two worlds."

"An electronic stage," Nancy said.

Macera nodded. "Exactly. There is an immediacy, an intimacy to a play that still reaches into our hearts. With Microanima, I have brought movies and plays closer together. Program-generated movie actors will now seem even *more* alive. The nuances that they bring to their roles by executing as the movie actually plays will blur the distinction between plays and movies."

"But this will require that the theaters upgrade their projection computers."

Macera shrugged, unconcerned. "We will only allow the new Microanima Dar Bannon movie to be shown in theaters which have adequate computers. The market will drive the theaters that do not have sufficient capability to upgrade in the near future. After all, they can't afford to be seen as lagging behind—their competitors will bury them."

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"So you're using software—your movies—to drive the hardware market."

"*My* movie," Bannon said with a smirk. "Eddie is nowhere in here."

Macera gave a forced chuckle. "I've created a monster. Dar treats me the same way he treats other characters on screen. He can't help it, he's programmed that way."

Bannon snorted. "Eddie's actually jealous of me. He wishes he were a program."

"I do not!" Macera said hotly. "You wish you were human."

Bannon delivered his famous sneer, then looked towards Nancy. "And face a lingering death by cancer? Or a car wreck? No, I'll live forever. Eddie will, too, but only in the history books. *I'll* be there to see it."

When the interview was over, Nancy stopped by Larry Marshall's office on the way out. "Hi."

He glanced up. "Oh . . . hi! How did the interview go?"

"Great! Dar and Eddie started arguing over who was the top dog. I can't wait to print some of the stuff they said."

Marshall laughed. "I can imagine. Eddie has a bit of an identity crisis at the moment. He's can't decide whether he's a film director or a stage director."

"He's both."

Marshall shook his head. "He's neither. He's changed the rules again. There's no going back. Once he gets that figured out, he'll settle into a new role for a few years, then get bored and strike out again."

"I wonder how long it will be before there's a computer program that directs movies."

"That would bring things full circle," Marshall agreed, "but no one knows how to program for genius. What Eddie's got can't be bottled."

Nancy nodded. "I guess not . . . yet." ■

Men will lie on their backs, talking about the fall of man, and never make an effort to get up.
Henry David Thoreau

Talent develops in quiet places; character, in the full current of human life.
Johann von Goethe

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THE ALTERNATE VIEW G. Harry Stine

THE MOST IMPORTANT CD-ROMS IN THE WORLD

In the January 1981 issue, my *Alternate View* column discussed "The Most Important Books In the World." I posed a fascinating game with readers, one to which Robert A. Heinlein had introduced me back in 1950. It's a simple game. It's also very controversial. The rules are:

The world is about to end or you are about to embark on a multi-generation star flight. You are permitted to take six, and only six books with you. What six books do you take if you wish to use them to start over?

I got some interesting answers from readers that I summarized in a later column. It was patently obvious from the responses that an individual's selection told a great deal about that person. It's a great parlor game, but look out because it bares your personality to the breeze.

Because I'm a capitalistic technological humanist, I published my selection. It hasn't changed much:

Marks' Mechanical Engineer's Handbook.

The Chemical Rubber Handbook.

Mellor's Modern Inorganic Chemistry.

The Merck Manual.

The Handbook for Boys (older version about 1950).

H. G. Wells's *Outline of History.*

If you don't recognize those books from their titles alone, don't even bother to play the game because we aren't debating on the same wavelength.

Marks' is an engineering handbook that tells how to do things.

The Chemical Rubber Handbook is another basic scientific and technology handbook with lots of tables.

Mellor's Modern Inorganic Chemistry is the best basic book on chemistry I've ever found.

The Merck Manual covers the human body, health, and medicine.

The Handbook for Boys, the old Boy Scout manual, had a lot of excellent outdoor survival information in it.

The Outline of History by H. G. Wells is a concise collection of what has happened to us, the mistakes we've made, and how we solved or didn't solve them (usually the latter).

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I figured I could start over with those.

Well, the world did end, and those books helped me get through it. (You didn't know the world had ended, did you? More about that in a moment.)

In the October 1990 column, "The Senses of History," I remarked about the difficulties preserving data and information for more than a hundred years. Paper goes to hell, and few documents survive. We don't know how well Eastman style silver-salt photographs survive the rigors of time. We don't know how long magnetic recording media will hold its data. We do know that by carving records into granite they will survive about 50 centuries because such records have.

Sigh. Technology has changed everything again.

Thanks to the laser, a 1960 "invention looking for a job," we now have the Compact Disk Read-Only Memory (CD-ROM). It packs a very large amount of data into a very small volume. It's made of glass. The way the information is entered into the CD-ROM may allow it to last for several centuries. My progeny will find out about that.

The CD-ROM has also required me to revise the Six Books Game.

Because of consulting work I'm doing, I obtained a Sony Data Discman Electronic Book Player Model DD-1EX. It may not be the first electronic book machine on the market, but it's one of the early ones. It's about 4 inches by 6 inches by 1.625 inches and occupies a volume of about 39 cubic inches. That's about the size of a paperback novel. This gadget operates on a 9-volt battery. It weighs approximately 1.25 pounds or 20 ounces.

It can display the contents of a CD-ROM enclosed in a plastic packet measuring 3.5 inches by 3.5 inches by 0.25 inches. A CD-ROM electronic book can contain up to 100,000 pages of printed text, 32,000 graphic images, or a combination of both. The CD-ROM occupies a volume of 3 cubic inches.

If I'm limited on the basis of volume in my selection of data bases (books) according to the old Six Books Game, I calculated what would be involved. (No question about comparison on a weight basis!) I took the six books listed above from my library shelf and measured each one of them. Together, they came to 629.5 cubic inches.

That's equivalent to the volume of 196.8 CD-ROMS.

The Game of Six Books is thus no longer valid, thanks to technological progress. If you want a similar game now, it's the Game of Two Hundred Books. And that's no fun to play because you can now put a whole personal library into the same volume that was formerly required by the six books.

Now I can take along a whole encyclopedia on a single CD-ROM. Another one can hold the Bible, the Koran, the complete works of Shakespeare, and the world's other great literature. A third one will hold all the other six books on my list!

Furthermore, the data are likely to last longer.

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How about the Electronic Book Player? Aha, that's the critical item! A smart person will figure out how to make a simple solar cell electrical source to provide nine volts to run the gadget. No big deal. My first four-function calculator purchased in 1970 required four Size D cells. Today, its offspring are run by photovoltaic cells. No big engineering problem to convert the electronic books gadget to photovoltaic power.

And the unit I now have is one of the first. In the next five years, its progeny will get smaller, cheaper, simpler, and less power-consumptive.

I'm perhaps fortunate. I've retained a sense of wonder about our universe. It's recharged from time to time by such acts as simply holding a CD-ROM in my hand (by the edges, of course; one must learn how to handle technology properly). Here in that silvery disc is the intellectual effort of thousands of people stretching back perhaps thousands of years. It brings home the importance of the greatest discovery of Thomas Alva Edison.

As a Western Union messenger boy, Edison discovered that information is often far more valuable than physical objects. Information is nondimensional but may be timely. One of Edison's first successful inventions was the stock ticker. Yes, Edison made his money in the stock market, but in a different way than anyone else!

The CD-ROM is one of the important inventions of the Second Industrial Revolution. The first Industrial Revolution involved the noisy, big, powerful, energy-consumptive, muscle-bound technology exemplified by the reciprocating engine. The second Industrial Revolution is the use of information to control the legacy of the first IR. It's exemplified by the feedback circuit, the solid-state device, the microchip, the laser and the CD-ROM, and other information devices that are quiet, tiny, powerful in a different way, energy-efficient, and elegant. The difference is analogous to that between a world-class weight-lifter and a ballet dancer. It's a difference in the degree and kind of control and information density.

I no longer write using any sort of pen. Nor do I write using the mechanical monstrosity called a manual or "electric" typewriter as I did when I started getting stories published in this magazine forty years ago. I now use the quiet, easy, energy-efficient personal computer. Even the printer is no longer an automatic electrical typewriter; it uses a quiet jet of ink. And as a device the printer isn't long for this world, either. Someday, Ye Olde Editor will accept my columns on a diskette instead of hard copy on paper that comes from cutting down trees. Some editors already insist on diskette submissions.

Will this mean the end of books and magazines printed on paper as we know them? Yes. Where can you get documents hand-copied on parchment these days? Or on papyrus? The only objects containing information engraved in stone are in graveyards and national capitals. (People seem to do very little in both places.)

Some of you may not like it. But I will. I realize that the device or object

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isn't important. What it does and how well it does what it is supposed to do are the important criteria.

Over the past few weeks, I moved my book library and my LP records for the last time. The next time, I will move a couple of boxes of CD-ROMs. Or whatever the latest information storage medium may happen to be.

And all this is coming along right on schedule, too. Thirty years ago, I expressed concern that the amount of information available to us was doubling every seven years. Now it does it in five years. In 1950, Robert A. Heinlein was interested in library science; he was concerned about our ability to store, access, and use information. Well, we're handling the "information explosion" very well. We simply developed the technology to do it. We had to. And someone could make money doing it.

And what's this about the world having ended? One of the sneakiest predictions in the forecasting business was once the most extravagant, unbelievable, and hilarious:

"By the year 2000, the world as we know it will no longer exist."

Look around you. It's happening. The world of 1981 with my Six Books Game is going rapidly. The world as we knew it in 1950 is already gone. If you lived in that time, you should be pleased. And filled with wonder that we managed to get through it. Mostly, we did it by creating, storing, accessing, and transmitting information better than ever before in history.

Information is power! I love my CD-ROMs! ■

LESSER IRONIES OF SCIENCE

Robert Frazier

Primordial soup: the soup from which microbes grew
Leftover soup: the soup in which microbes grew

"Anthropic" principle: we see things exactly the way they are because if they were different, we wouldn't be here to see them
"Campaign" principle: no two political analysts see the race the same way (not even vaguely the same way)

The Universe is expanding
The budget for its exploration is shrinking

Artificial intelligence: the result of years of computer advance; *e.g. programs that play chess*
Artificial stupidity: the result of years of computer advance; *e.g. programs that check your spelling*

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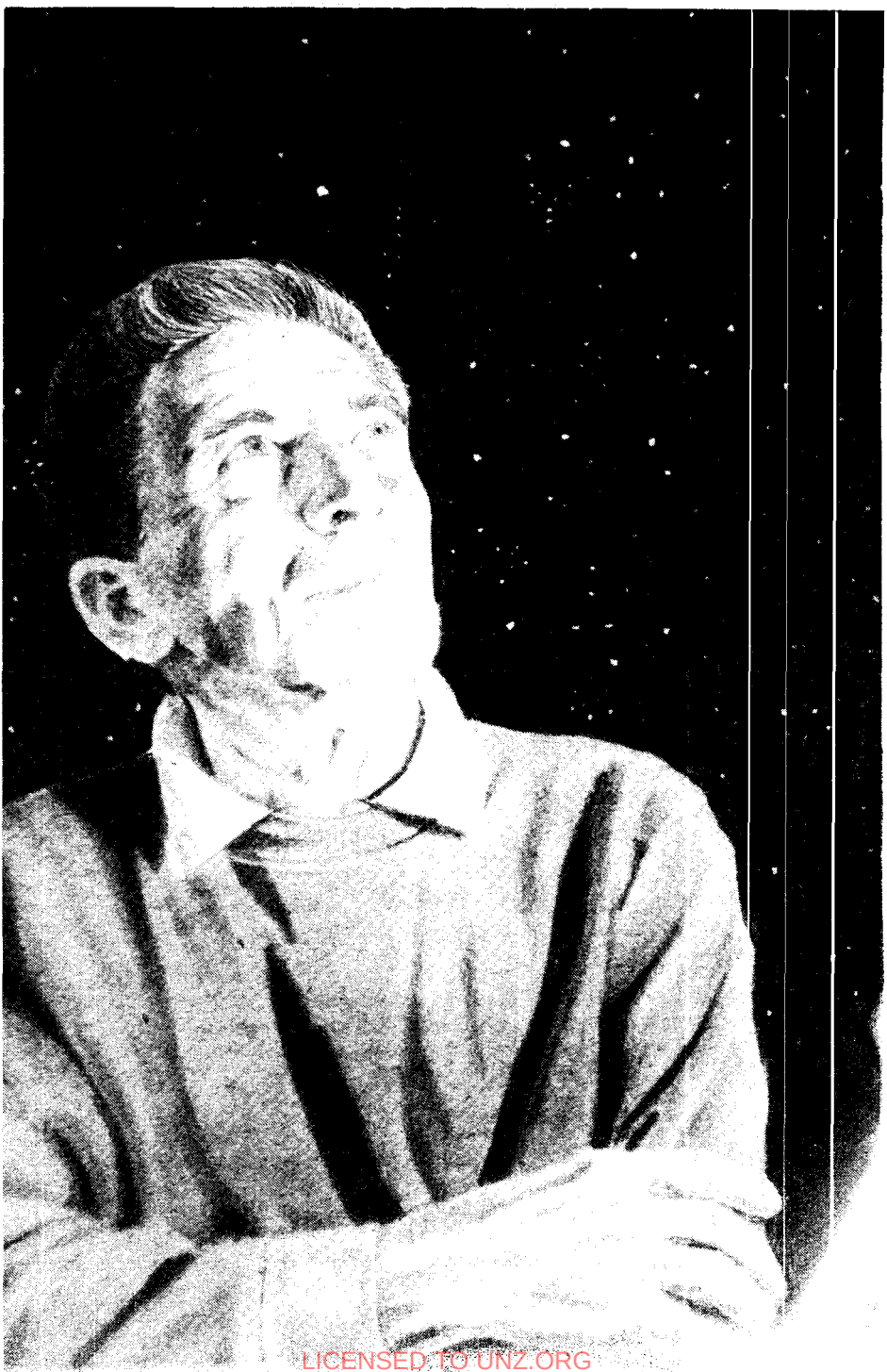

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THE RETURN OF THE GOLDEN AGE

Jeffery D. Kooistra

When a project becomes a Big Government Operation, it's easy to forget the one ingredient it must have. . . .

Illustration by Steve Cavallo

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It was all Robert Heinlein's fault, him and all those stories he wrote. But it was Jimmy's idea; I just went along.

You've seen it there, the Moon hanging in the sky on a summer's night, bright and full, with Peggy Jean on your arm and poetry in your soul. Or maybe you remember it better as two horns pointing up, maybe three days after she's new, say ten or eleven o'clock in the evening.

It doesn't matter how you remember it, not now when you can see Luna City on her face with a dime store telescope; not when she has a government of her own to mess up things for the regular folks.

A million people live there now, but it hasn't been that way for long. Nope. Back at the turn of the century only twelve men had ever been there, and that had all ended thirty years before. We call those years the Collapse now, but we didn't have a name for it then. I think old Mr. Heinlein would have called it the crazy years. The name would fit.

Jimmy and me were Delta Clipper pilots. You've probably seen pictures of the old Delta Clippers in history books. They were the first of the single-stage-to-orbit rockets. The SSTOs revolutionized space travel. They had incredible thrust to weight ratios, at least for those days, were fully reusable, and had short turnaround times. This was a big deal then because before the Clippers came along the best thing going couldn't be put up more than every other month or so, and even then some of its biggest parts were just thrown away.

I think Jimmy first got the idea to go to the Moon two years before we actually did. He didn't tell me about it then, but I remember that look in his eye after the night at his house.

Jimmy's wife Molly had fixed a good spread that night, a big roast with stuffed baked 'taters, and corn and beans, and fresh baked apple pie afterwards. Jimmy was already on the far side of fifty by then, and he and Molly had been together for thirty years or so. That wasn't all that common back in the Collapse years. Anyway, they didn't have any kids at home anymore by then, and Jimmy said Molly kind of liked it when he brought home his young bachelor copilot for dinner. I didn't think twenty-six was all that young then, but I wasn't about to pass up a home-cooked meal, so I didn't mind putting up with the little bit of motherin' Molly used to give me.

After dinner, Jimmy and me were sitting in front of the fireplace, talking about how we got into the space business.

"It was the stories I read as a kid," Jimmy said. "Our school library had all the good old science fiction stories, golden age stuff: the Heinlein, the Asimov, the Clarke. And it seemed like every week the used book store would have a different paperback anthology I could pick up for a nickel."

"It was like that for me, too," I said.

"But you grew up in the 'nineties, Max. There wasn't any good science fiction then. All the sense of wonder was gone. Just cyberpunk and dragon stories and yarns about lawyers. Who wants to read about lawyers?"

"Hold on, Jimmy. It wasn't like that. It may have been the 'nineties, but I grew up so far back in the Ozarks we

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didn't even have cable. And my school library only got two new books a year, and kept all the old ones. I plowed through eight of the Heinlein Juveniles when I was twelve, and reread all of 'em at least twice over the next three years."

A light seemed to turn on in his expression. "So you do know what it was like, don't you? You remember what it was like to finish one of those books and go out into the back yard and just look at the stars and the Moon, and try to find a planet or two."

"And wonder, Jimmy. Wonder what was out there, and want to go *so* bad."

"Yeah." We just stared into the fire for a while after that. "But the reality isn't like that, is it Max?" he finally said.

"What do you mean?"

"I mean, I got into space for the romance of it, you know? I was nineteen when the *Apollos* first landed on the Moon. I was on furlough from flying combat missions in 'Nam and watched it on TV in the Philippines. It was the dream come true, but it wasn't like in the old stories. NASA was nothing like D. D. Harriman, or the group of teenagers and their scientist uncle in *Rocket Ship Galileo*."

"No," I said. "But those old stories weren't very realistic, were they?"

"Maybe not. Space travel was a little more difficult than some of those stories made out. But that's not the point—there was a spirit in those stories that just didn't happen in reality. The people in the stories had drive, and vision, and *guts*, and made that trip to the Moon their very own, in ships built by their own hands, following their own dreams. The Apollo astronauts, God love 'em, were just the lucky ones out of a cast of thousands who actually got to go."

I started to protest. "They were more than that—"

"Oh, yeah? Name all twelve."

I tried. "Well, there was Armstrong, of course, and Aldrin. And Alan Baen . . ."

"Bean. Alan Bean."

"Oh. And Shepard, and Glenn . . ."

"Glenn never went to the Moon."

I eventually got three more, but that was all.

"See? Twelve men who walked on the Moon, who fulfilled the great adventure, and people can't even name all of them. You can't, and you're a spaceman." He shook his head in disgust. "I got into space because I wanted the adventure, I wanted to see the planets, I wanted to take twenty-foot steps across the Sea of Tranquility. But the most I've ever done is ferry up ABM satellites to geosynch. The space station isn't more than a gas station, and no one's been back to the Moon in thirty years."

"It's a damn shame," I said.

"It's a goddamn *crime!*" Jimmy said. "And we could even do it now, with a refueled Clipper and the right program. But no one wants to! They're still talking about maybe returning to the Moon in ten years, but hell, I heard that ten years ago."

"Poor Jimmy." It was Molly coming in with the coffee pot to warm our cups. "Don't let him get you down, Maxie. I've been listening to this same speech since my honeymoon."

I looked at the clock. "No more for

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me, thanks. I should be going." Jimmy was scowling into the fire. "Don't worry, Jimmy. Maybe someday you'll still get to go."

And that's when he looked up at me, and there was this look in his eyes, like somehow he had an idea coming together, and he said, "Yeah, Max. Maybe someday."

Two years went by before the subject came up again, and I didn't think about it much during that time either. It wasn't like there weren't a lot of other things to think about then. Like I said, this all happened during the Collapse, when it wasn't clear who was running what, or when money was going to be around or when it wasn't.

Jimmy and me were lucky to be Clipper pilots, because the US government (the old US) was going ahead with its antiballistic missile program, and there was plenty of work for the Clippers moving the space-based elements up into orbit.

But most people weren't as lucky as us. We got housing and benefits from the company, so our neighborhoods were patrolled at night, and we always had plenty to eat. But for folks without good jobs there was just the streets and belonging to the gangs, at least if you lived in the cities. Out in the country it was a different matter, but if you lived in the city you didn't want to go out in the country 'cause you'd more'n likely get shot.

It wasn't all rosy for us, either. Though the government wanted to put up the whole ABM system, they didn't want to pay the company for any new Clippers, so if we lost one, the others had to pick up the slack. And with one less boat, that meant the two oldest pilots would be retired from piloting. The way Jimmy figured it, we could only lose one more boat, because the one after that would mean he'd get the boot. And what with the higher work loads, losing boats became even more likely.

I know, it was nuts. The government should have just replaced the lost ones, but what can I tell you—it was the crazy years.

Anyway, I liked being teamed with Jimmy, and I didn't like the idea of losing him to mandatory retirement, so the fear was always in the back of my head that sooner or later something would happen and we'd be split up.

And then Molly died. They said it was a heart attack. I guess that's as good a cause of death as any, though it was the gang that attacked her car that scared her into it. Jimmy was never the same after that. I stopped seeing him much outside of the cockpit. Every now and then we'd still have a drink together after touchdown, but I could never get him to talk much, not like he used to. I'd try to get him to do things with me on some of our off weekends, but he'd always tell me he had to "go to Jerry's." I figured it was some bar where he could go get drunk for the weekend and they'd take care of him.

The day it all happened Jimmy was almost late for lift-off. I'd finished the preflight check by myself, kept checking my watch and looking out the hatch for the ground transport bringing Jimmy out to the pad, and finally saw it roll up. Jimmy got out with a new overnight bag and took the elevator up.

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"Where have you been, Jimmy? We gotta lift in half an hour!"

"Sorry, Max. I got held up at Jerry's. Some last minute kind of things, you know? Anyway, I'm here now and the ship is still on the ground, so what are you worried about?"

Well, what I was worried about was that he'd been acting even stranger than usual lately, and the trips to Jerry's were happening more often, and I half thought Jimmy might be heading for a break down or something—but I didn't tell him any of that.

We strapped down and talked to the tower. Then right on schedule all twenty-four motors kicked in and we headed through the wild blue and into the great black.

The Clippers were mighty fine machines to fly, and I mean really *fly*, not like what pilots do nowadays on repulsors and counter-gravs. You need the blast of a rocket at your back to make you feel like you're really going somewhere in a hurry.

The Delta Clipper we flew in those days was the third in the series. That made it the DC-3, just like the famous airplane that made air travel commercial. Jimmy named our boat the *Lunatic* because he said it was appropriate to the times. We were hoisting fuel up to LEO for the orbital transfer tugs. Jimmy used to always point out that if we just used that fuel for the *Lunatic* we could go to the Moon, but I didn't take it seriously.

I guess I should have.

The *Lunatic* was a dandy boat, with all the newest bells and whistles. The Delta Clippers always took off and landed vertically, but the DC-3 model was the first that could take off and land anywhere. The earlier ones always had to put down at a spaceport, or at least an airport, but ours had oversized landing pads and a top of the line landing radar, so we could put down anywhere with solid ground. That's how I got to the Sahara desert once, but that's a whole other story.

We hit orbit right in the groove, 150 miles up or so. The first transfer tug was waiting for us and I suited up and went out and connected it up to the FTH. (That's Fuel Transfer Hose; we never did call much of anything by what it was back in those days.) That all went just swell, but when I got back inside I found Jimmy hooking a data cable from his fancy new travel bag into the flight computer.

"What are you doing, Jimmy?"

Next thing I know Jimmy has a gun pointed at me and he's telling me to shuck my suit real slow like. "Make yourself comfortable, Max," he said. "We have a long flight ahead of us. We're going to the Moon, Max!"

"You're crazier than a 'coon in a 'shine still!" I yelled at him. "We can't get to the Moon!"

"We have enough fuel, you know that."

"That ain't it. You don't just point the ship at the Moon and blast, you know. You gotta calculate the orbit and the burns and the mass. . . . Hell! You know all this!"

"That's what this thing is for," he said, pointing at the cable coming out of his bag. He took the box that the other end of the cable was attached to out of the bag and fastened it down to the control board so it wouldn't float around. "My buddy Jerry and some of

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his friends made this up for me. It's an autopilot, Max. Our entire flight plan is loaded into this little box. It'll control the burns, the orbital insertions, the landing, everything."

I thought about it. Hell, it was possible, I knew that. The Delta Clipper's had all been designed to be flown on full automatic if necessary. And he'd had plenty of time to get that little box together, I'd have bet.

"You can't keep the gun on me the whole way," I said.

"I don't need to, Max. In about one more minute the engines are going to fire and we'll be on our way. Then the only way you'll ever get back home is to just let the program run its course."

"What if I knock you out and radio for help? The ground could get me a flight plan back."

"By the time you get the radio to work again, you'll be out of range." I didn't think he would have busted the radio permanently, but he could have taken out parts and hidden them around the ship. So I just kept my eye on that gun barrel, and directly, the rockets fired.

After that, Jimmy showed me that the gun wasn't even loaded, and put it back in the bag.

"Why, Jimmy? Why did you do it?"

"Lot's of reasons, Max. I've always wanted to go to the Moon, you know that."

"But what about your job? You'll go to prison, and you'll never fly again."

"I wasn't going to be able to anyway, Max. I went to an old doctor friend of mine for a check up last month. I have a heart murmur. My next company physical is three weeks away. They would have grounded me."

"What about your family?"

"Molly's dead. The kids don't even call at Christmas anymore."

"Oh."

I didn't know what to say after that, but he had more reasons.

"The human race needs a kick in the butt, Max! We went to the Moon thirty years ago, and haven't been back since. There's no adventure anymore. There's no vision. You know what it's like down there." He swept his hand past the port, taking in the Earth. "All those people down there rotting away in cities with no dreams, no hopes, no one to show them the way out. I grew up in a time when we reached for the stars, and expected to touch them. No one does that anymore.

"And this might be the last chance we have in a long time. The guys who made up that box for me aren't going to be around that much longer. And the way some of those congressmen have been eyeing the defense budget, the Delta Clippers might be all grounded by next year."

He was really serious about all this. And he was my friend. "I'm sorry about your heart, Jimmy. I didn't know. But I don't like you pointing that gun at me. If you'd just explained yourself, you might not have had to use it."

"I couldn't do that, Max. I like you too much. When we get back you're going to tell everyone how I held you at gunpoint and made you go along. You still have a career and a life ahead of you to live. You're not going to spend any of it in prison because you let some starry-eyed old coot talk you into stealing a spaceship and taking a

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spin around the Moon."

We watched the Earth for a while, slowly turning below us. "How long we going to be away?"

"Three days out, three days back, one day on the surface."

"Wow. We're going to land on the surface! Where?"

"Mare Imbrium."

"Why there?"

"We have a little job to do. I had to agree to it to get Jerry's help with this, but I would have done it anyway if I'd thought of it." He retrieved his bag again and took out a book of Heinlein stories and something sealed in a clear plastic block. A knife was stuck right through the block. Jimmy handed it to me.

On the block it said "Robert A. Heinlein." Sealed inside was something that looked like a shipping tag with a poem written on it. The poem went like this:

"Under the wide and starry sky
Dig the grave and let me lie.
Glad did I live and gladly die
And I laid me down with a will!

"This be the verse you grave for me—
'Here he lies where he longed to be,
Home is the sailor, home from the sea,
And the hunter home from the hill.' "

"What's this for?" I asked.

Jimmy pushed the book at me. "Here. It's all in here. Read the story 'Requiem' sometime. We owe this to Mr. Heinlein—all of us." He looked a little misty after that and I didn't say no more for a while.

* * *

I'd seen the Earth from space before, lots of times, but never like it was on our way to the Moon. If you watched her for a long time, you could sorta get the feeling that she was receding into the distance, but it went so slow that it was hard to notice. I'd seen pictures of the Earth like that, taken from those old Apollo missions, just like a big blue marble hanging out there in nowhere, all water and clouds and sometimes some green spots, too. It was something to see all right, but of course you've probably seen it for yourself already.

That little box Jimmy hooked up to the computer worked wonders. Some time in between the second and third days Jimmy warned me to strap myself down for a course correction, and it came right on schedule. It was hardly worth strapping in for, but we were just being safe. But the parts from the radio got moved around.

I'd been right about what Jimmy did—he had only taken out some of the radio parts and hidden them around the ship. After we were out of radio range of Earth anyway, he told me I could put it back together, but the course corrections flung the parts from hell to breakfast so they weren't where Jimmy had put 'em any longer. It took me the best part of a day just to find all of them. By the time I got it back together again we were real close to the Moon, and we spent a lot of time just watching her get closer.

You can't feel the way we did anymore when you go to the Moon, not when you can see Luna City sitting out there in Mare Crisium and the streaks on the surface from the helium-3 min-

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ing. But we were the first guys going back in over thirty years and the place was still as virgin as an old spinster. She looked just as I'd dreamed she would when I watched from the back forty in Missouri.

And that little box put us right smack dab into orbit just like it was supposed to.

"Who is this Jerry guy you got that box from, Jimmy?"

"An old friend of mine. And of Heinlein's. He's been around space and science fiction and all that for years, but he doesn't want anyone to know he was in on this for legal reasons, so I can't tell you anymore about him."

"Did he build that little jewel there you got flying the *Lunatic*?"

"No. I wouldn't put it past him to be able to do it, but he had some of his wizard friends whip it up. There's a space underground out there that wants to get off Earth in a big way, and they design things like this for a hobby."

Jimmy explained the box a little to me. It was just a fancy computer really, with a fancier program, and it sure knew how to fly a Clipper.

"Why did it put us in orbit first? Couldn't it have just brought us straight down?" I asked.

"It's good, but not that good. We needed to orbit first so it can calculate our position with respect to the global positioning satellites in Earth orbit. It's a bit of a stretch to fix on signals when you're 240,000 miles away, so it needs time to get its bearings."

And then it was time to land.

The rockets fired and we fell toward the surface. Jimmy stayed in his pilot's chair, and I stayed in mine, too, but we didn't really need to. The box kept watch on the landing radar and controlled the throttle, so mostly I just watched as we came down.

We were still three miles up when Jimmy turned off the box.

"What did you do that for?"

He took control of the *Lunatic* and we continued our descent on manual. "I'll be damned if the first men back to the Moon are going to be landed by machine. It ain't right." I sort of saw what he meant, but I was still nervous. Jimmy had landed hundreds of times on Earth, but that's under a full gee of gravity. I hoped his Earth reflexes wouldn't mess him up here in the Moon's one-sixth gee.

He did us proud, though, and put us down just a soft as you like.

"Welcome to the Moon, Maximilian!" He had the widest smile I've ever seen.

"Welcome yourself."

We looked out the port over Mare Imbrium. Here and there, for as far as you could see, were little craters and rocks, and way out at the horizon you could see the tops of some mountains. "Why did you want to land here, Jimmy?"

"If you'd read that story I told you to you'd know."

"I will later," I promised. "So when do we go out?"

"Right now is as good a time as any."

We went back to the hold where we kept the suits. They weren't really Moon suits, just the ones we wore when we went outside the ship to work. I was mostly worried about the soles of the boots. The ground out there was hot in

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the sunshine, and the boots weren't insulated for walking on it.

"I brought that question up with Jerry," Jimmy said. "He did some checking and said we'd probably be OK if we kept our walks under thirty minutes or so." Hell, if it had only been safe for one minute I would have done it, at least long enough to take one twenty-foot step.

I did my usual checkout of my suit and discovered that the air tank was empty. "Damn! How did that happen?"

"Didn't you charge it when you came back in last time?"

"Of course I did, Jimmy. I'm not that green."

A few minutes of tinkering and knob twisting didn't help me any. "The refill valve is just plain broken," I said. "And this ain't the sort of thing I can fix out here." So much for bounding across the Moon.

"Don't worry, Max. I'll let you use my suit. We just won't be able to go out at the same time, that's all."

"OK. But you go first, Jimmy. This was all your idea anyway. You deserve to go first."

"Damn right I do!" he said, but he was smiling.

He got all suited up then himself. "Now all I need is Heinlein's grave marker. It should go out on the first trip."

He went into the airlock, and when it closed shut I went to the port to watch him head out. The port wasn't in the right place to watch him take that first step off the ladder, but over the radio I heard him say, "This time we're going to *stay!* I'm on the surface now, Max. Watch for me." He came bounding out into the open, covering at least thirty feet between steps. "Yahoo! You're gonna love this, Max!" I could hardly wait.

"I see a good size rock I'm going to put the marker by, Max," he said after a few minutes. He walked off to some place on the other side of the ship and I couldn't see him anymore. I wanted to keep talking to him, but then I thought he might want to be kind of respectful and quiet when he placed the marker, so I just kept my mouth shut.

Since I had a few minutes I finally picked up that Heinlein book so I'd have a better idea of just why this was all so important to Jimmy. I turned to "Requiem." Right there at the beginning I found the poem that was on the shipping tag.

You know the story: Old man Harriman, the guy that got everyone to the Moon in the first place, never gets to go himself because he's too old and the powers that be won't let him. So he up and hires a couple of pilots to take him there in a rocket. I found out that the rocket was named *Lunatic* just like ours, and it put down in Mare Imbrium just like we did. And then at the end Harriman dies and they leave him there on the Moon with just a shipping tag with the poem on it pinned to the ground with a knife.

So that's how it was, and Jimmy was doing it for Heinlein.

I didn't really read the story that close right then; just sort of skimmed it to get the idea. But it made me sad just the same, how the old guy wants to go to the Moon his whole life and then he can't, and then he dies there.

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It was sort of like how it was with Jimmy, except for the dying part.

Or was it?

"Jimmy, how's it going over there?" No answer. "Jimmy? Jimmy!" He wouldn't answer me.

How could I have missed it? What did Jimmy have left? Molly was gone, his kids didn't call, and they were going to ground him, keep him out of space forever because of his heart. All he had left to live for was going to the Moon, and he'd done that now. Why bother to go on living any more? And why was my air tank broken? Jimmy must have done it so I couldn't stop him. And he knew the ship could take me home all by itself, so he wouldn't be takin' me along with him.

"Jimmy! Answer me!"

I had to do something. But what? I couldn't breathe vacuum.

They'd always told us that with an empty tank a space suit holds about five minutes of air—if you don't move around too much. The airlock cycles in twenty seconds, so figure what with getting the suit sealed up and me into the lock, it'd take about a minute just with getting out and back in. That would leave me four minutes to stop Jimmy. Of course, I'd be moving a lot and burning up extra air, so it would really be less than four, but I had to try it.

I got my suit on lickety-split and heard the airlock clang shut behind me. Then the air was gone and the outer door opened silently onto the plain of Mare Imbrium. I dropped down the ladder ten rungs at a time, hit the ground and raced around the ship to find Jimmy.

There he was! Right by that big rock over there. He was kneeling down. "Jimmy! Jimmy, don't do it!" I shouted as I bounded toward him. He still didn't answer. "Jimmy . . ."

I started to see little white lights out the corners of my eyes, then the walls started caving in. Air lasted a lot less than five minutes if you were running. As I went under I wondered if I'd beat Jimmy to being the first man to die on the Moon.

I woke up to the sharp scent of smelling salts in my nose. Jimmy was looking at me real worried like and I realized I was back inside the *Lunatic*. "Max. Maxie. Are you OK? How're you feeling?"

"I'm alive?"

"Yes, you're alive, you idiot! What the hell did you think you were doing, coming out without air in your tank?"

"I was trying to keep you from killing yourself," I said. "I thought you wanted to die on the Moon, just like in the story."

"Why would I want to do that? I'm crazy Max, not suicidal."

If I'd been more with it then I would have just shut up, but I was babbling. "But Molly is gone, and they're not going to let you ride rockets anymore. And your kids don't call—"

"But Max, I do have *grandkids*. I'm not going to leave them alone to suffer at the hands of my children."

"How did my suit tank get broke?"

"Sometimes things just break, Max."

"Then why didn't you answer me on the radio?" I asked.

"I turned it off for a few minutes. I was observing a moment of silence for

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the dead. I don't know if Heinlein was religious, but I am. Especially at funerals."

Anyway, that's how it all happened. We left the Moon just as planned and headed back for Earth. We had to refuel in Lunar orbit, and even then there wasn't enough fuel left for us to land back on Earth, so the box just put us into a nice orbit and we waited to get picked up.

And you know what happened after that—it's in all the books. How Jimmy's story got all around the world and he became a hero, and never did go to jail. And how Mr. Vander Kam of Capitol Products, when he saw how easy it was, bought some of his own Delta Clippers because his genius scientist Dykstra knew how to do fusion if he could just get the helium-3 from the Moon. And how the other big companies didn't want Capitol Products to have it all, so they bought even more Delta Clippers, and so that was the end of the Collapse and the start of the Moon Rush days.

Yeah, it's all in the books.

I live in Luna City now. The low gravity is good for my heart. Every now and then I go out to Mare Imbrium to visit the Heinlein Shrine. They left the marker just the way Jimmy put it, except that there's two markers now.

Jimmy died about thirty years ago so I had another shipping tag with a knife through it made up with Jimmy's name on it. As I understand it, Mr. Heinlein's ashes were scattered at sea. That didn't happen with Jimmy. He's that dark spot underneath his marker. ■

One never goes so far as when one doesn't know where one is going.

Johann von Goethe

Always do right. This will gratify some people, and astonish the rest.

Mark Twain

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THE ALICIA CONSPIRACY

Doug Larsen

Weapons don't have to look like weapons to be potent. . . .

Illustration by Janet Aulisio

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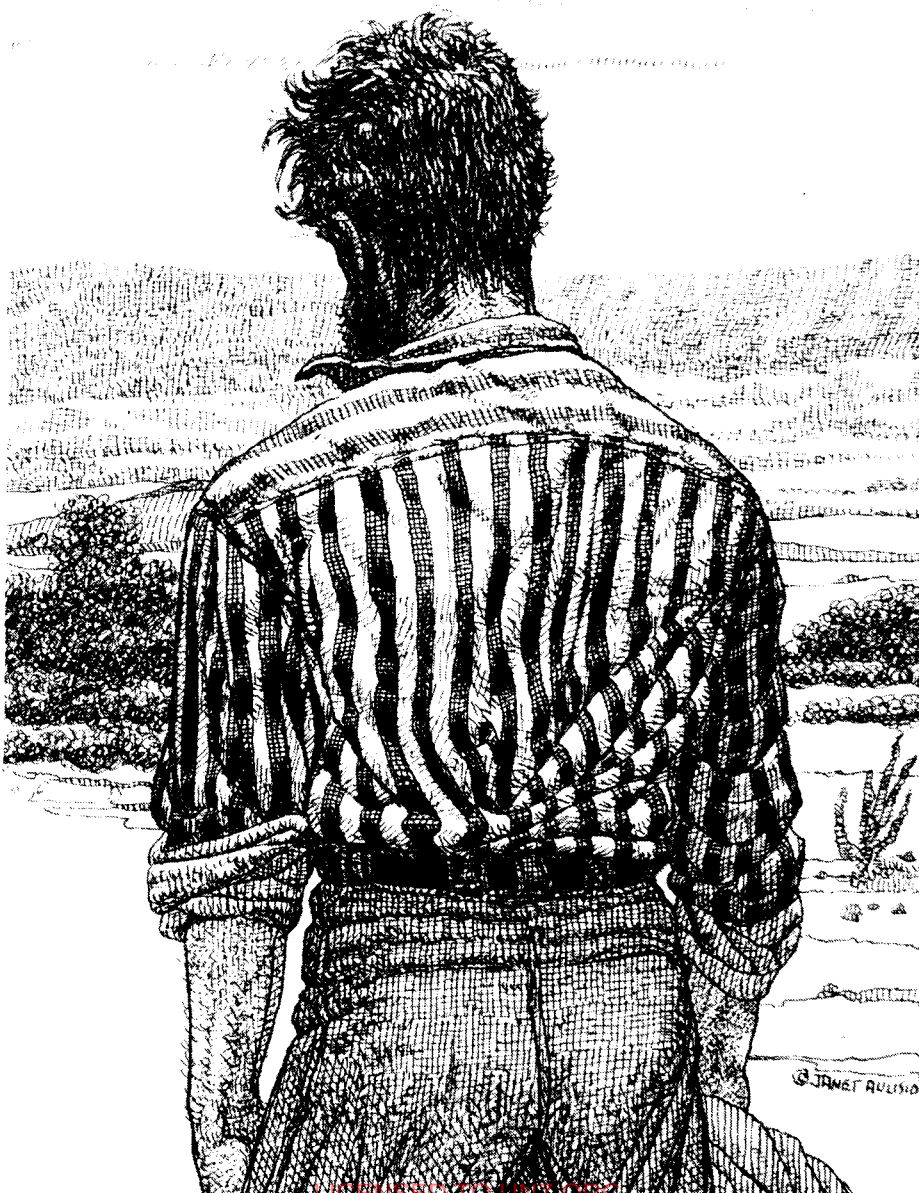

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It's in that soft, gray time between sleeping and waking. That time when I'm feeling drowsy and content because I'm not awake yet, and I assume that I'm in bed with my wife just like every morning for the last forty years.

And then I stretch, and I remember.

Alicia is dead.

Immediately, the pain rips through me, and I want to curl up in a ball and cry, because my wife is dead, and the loss is more than I can bear.

Oh, Alicia, I loved you so much. . . .

I hate mornings. I've relived the shock and the grief of my wife's death every day for the past six months. I used to lay in bed and drown in sorrow, until my daughter took a hand. She showed up one morning and dragged me out of bed.

"Mom is gone, Dad," Jane scolded. "You can't just lie in bed wishing that she wasn't."

In desperation, I tried to run away from my pain—away from everything familiar to me. With Alicia gone, I couldn't stand my own house. I couldn't stand seeing my baby granddaughter, with Alicia's eyes, looking at me so innocently that I would hold her little bundle in my lap and sob.

Running away hadn't helped. It didn't matter that I was thousands of miles from home in a tattered Third World country—it didn't override the soft, gray area between sleeping and waking.

I had arrived in Thusbammanna the night before, a member of the International Executive Service Corps. The IESC is made up of retired professionals who go to underdeveloped countries and help develop a business.

Alicia and I had talked about the two of us doing a hitch in the IESC after I sold our successful greenhouse business. With the sale, we had plenty of money. Now it just mocks me, because what good is it now?

I rolled over in bed and groaned. I was late, but just couldn't make myself care. I took the elevator down to the street. A car was parked on the side with a guy waiting inside. When I came out, he hurried up to me.

"Excuse me, are you Mister Kenneth Anderson?" he asked in excellent but heavily accented English.

I said I was.

"My name is Chantlo. I will be your driver for your stay in Thusbammanna," he said.

"Nice to meet you," I said. He seemed like a pleasant guy, but I just wasn't interested in anyone.

He helped me into the small economy car, and got in beside me. "Do you wish to be taken to your main office?" he asked politely.

I nodded.

I didn't notice much of the city as we drove. We arrived, and Chantlo ushered me into the building. He busily told me important facts, but I only answered when he asked what time I wanted him to drive me home.

I was introduced to some assistant to the Minister of Economic Development. He escorted me to my office.

"We are most grateful that you have come," he said warmly. "We are optimistic about increasing our flower export business with your assistance." He showed me around, and then left.

I sat at my desk, and started thinking

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about Alicia. I tried to work, but I just couldn't think. I stared at my paper—a couple of hours had passed, and I had accomplished nothing. Just moving the pen on the paper was exhausting.

I wanted to get out of that little office, but I had nowhere to go. I considered exploring, but the thought of getting out of my chair was exhausting too.

Somehow, the time passed and Chantlo was waiting for me when I came out of the building. He was a very friendly fellow, but I just couldn't hold up my end of the conversation. We lapsed into silence, and he drove me back to my apartment.

Thusbammanna pays for my room, board, and pocket money. The complex where I lived housed several foreign service people. I met a French guy, and a German couple, but I didn't remember their names.

I went to bed.

The next several days took the same pattern. I got up in the morning and finally made it down to where Chantlo was patiently waiting. He drove me to my office, where I spent an excruciating day of boredom and sadness. Then he drove me back to the apartment, where I immediately went to bed. The other residents of my building learned to ignore me.

I don't know how long I lived like that, but one day I got a letter from Jane. I ripped it open with the first enthusiasm I'd had in God knows how long.

The letter was full of concerns for my health; both physical and emotional. She wanted to know if I was holding up all right, and whose idea was this, anyway?

It was your mom's, Jane. She had talked about it a lot before she died.

The rest of the letter was the usual newsy stuff: her business was doing well, Duane had been promoted to MIS Manager, Tommy was playing a tree in the school play, and little Alicia had a new tooth.

I read the letter several times before I went to bed. I lay looking up at the dark ceiling for a long time, like I usually did. But Jane's letter sent my mind off on a slightly different track. I thought about our greenhouse. Alicia had always been the brains of the operation—I was just a guy who had a knack for growing things in the dirt.

Suddenly I realized that I could not endure another day in that little office. I realized that I didn't even know where the country's greenhouses were. Where were they going to grow this stuff?

Maybe I should check on it; find out the scope of their operation.

The morning was bad. I plodded out to meet Chantlo, ravaged by the soft, gray time before waking. Going anywhere was too much work. It would be easier to just go and sit behind a desk.

We were halfway to the office when I realized that I couldn't face another day there.

"Chantlo," I said suddenly. He gave a start of surprise, like I had scared him to death.

"Yes, Mister Anderson?" he asked.

I had to clear my throat before I could talk. How long had it been since I had talked to anyone? "Do you know where they grow the flowers?"

"Certainly, Mister Anderson."

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"Could you take me there today, instead?"

"Of course." He seemed very pleased, and made several quick turns in traffic. We drove for a couple of minutes, and he offered some advice.

"It is somewhat of a drive to the growing areas, Mister Anderson. May I suggest that we purchase food for our noon meal?"

I was surprised. "How far away is this place, anyway?"

"Perhaps two hours, not more. But the workers are not expecting us. It might be wise to bring some food of our own."

"Fine. Find us a grocery store, and we'll get something."

He did, with a delighted grin on his face. It was a western-style grocery store, and we found everything we wanted. I paid for it, courtesy of the government.

Back in the car, Chantlo drove out of the city. The city buildings fell away, replaced by shacks squatting on desolate farms.

The road deteriorated too, and soon we were bumping along a wretched two lane, dirt road.

"Why is this place so far away, anyway?" I asked between bumps.

"I believe the previous government was planning to build a large complex of buildings there." Chantlo said. "Then they would have also improved the road."

"Why didn't they?" I asked irritably.

"They were overthrown in the coup."

I didn't know what coup he was talking about, but I didn t want to admit it.

I usually find farmlands to be more pleasant than cities, but this was stunted, wilting under the blazing sun. I kept trying to figure out why it was so bad.

After awhile, I asked, "Could we stop here for a minute?"

"Certainly, Mister Anderson."

I clambered out and knelt at the edge of a field. I grabbed a handful of soil. The dirt felt good against my skin.

"This stuff's awful dry," I said. Chantlo didn't answer.

"It needs irrigation. And fertilizer."

I looked at Chantlo, but he just looked polite.

"This isn't doing well," I persisted.

"Is it not?" he politely asked.

I gave up and got back in the car.

We drove for a while longer, and I saw some fields that were in horrible shape. "Let's stop again," I said.

Chantlo saw where I was looking. "But we are approaching the greenhouse," he said anxiously.

"Yeah, but I want to take a look at that field over there."

"It does not look like a very interesting field," he ventured.

I got the feeling he didn't want to stop, which aroused my curiosity. "Chantlo, I want to stop here."

"Yes, Mister Anderson," he said woodenly.

This was strange. Chantlo had never been anything but overly polite to me. I hurried over to the field.

"This field has been burned!" I said.

He said nothing.

"What did this? A lightning strike?"

"I am sure it was something along that order," he said.

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I heard a vehicle coming, and we saw an army truck jouncing toward us.

"Let us continue to our destination," Chantlo said quickly. "Please, Mister [illegible] son, let us go!"

"What's going on?" I asked. "It's just another army truck."

"Yes, it is of no consequence, but we should be going." He herded me back to the car, and started driving quickly.

I watched as we passed the army truck. All of the soldiers had rifles, and were staring at us. They didn't look friendly. Then I looked at Chantlo.

He was sweating with fear. He drove past the truck in a big hurry. Tension was etched on his face, and he was gripping the steering wheel like he wanted to crush it.

Puzzled, I turned and looked behind us. The truck had slowed down and the soldiers were still staring at us.

"What's going on?" I asked.

"There is nothing to be concerned about," he answered tensely.

I looked back. The truck had decided to keep going. Gradually they drove out of sight.

There wasn't much to say. I looked at Chantlo, and he kept glancing at me. He looked quite shook up.

Another fifteen minutes brought us to the greenhouses. Chantlo introduced me to the supervisor and the workers, and they welcomed me warmly. They were pretty excited about expanding into chrysanthemums—it meant more money and job security to them.

The greenhouses were clean, modern, and stocked with the best equipment. I got a tour, and I asked several questions. It felt good to be grubbing around in the dirt again. I was still puzzled about the army truck, but exhilarated at the same time. I realized that this had been the first time in ages that I had thought about something besides Alicia.

Beyond the greenhouse and peripheral buildings, there were a lot of mud huts with people milling around. Another army truck was parked between the huts and the buildings. I nudged Chantlo. "Are those the workers' living quarters?"

"No, Mister Anderson, those are farmers' dwellings. The living quarters are this way." He led me away from the huts.

I had a good time planning the chrysanthemum growing with the workers. They were friendly and enthusiastic, and I enjoyed myself.

Then it was lunch time, and Chantlo produced the food from our car. We all sat in the shade and talked and ate. Halfway through the meal, I heard some shouting and then some screaming. I jumped up. "What's going on?" I asked the group in general.

They were all silent, with wooden expressions on their faces. The screams intensified. "Somebody's screaming over there!" I said, with a feeling of stating the obvious.

"There are soldiers," the supervisor said.

"Maybe they need help," I exclaimed, and hurried toward the noise. It was coming from where the huts were. I was almost there when I heard someone calling me. Chantlo was far behind, calling.

"Mister Anderson! Mister Anderson, wait!" he was shouting. The screams

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were louder now.

"Come on," I called, and hurried around the corner of a building.

I stopped dead in my tracks.

A group of about ten soldiers was gathered around a water pumping area, all holding their rifles by the barrel. Four children were on the ground in their midst. As I stood there in shock, I saw one of them raise his rifle and hit one of the kids in the ribs.

There was blood on the ground.

I thought my eyes were going to pop out of my head. I was so shocked that I couldn't move. I had never seen anything so barbaric in my life. A couple of the soldiers saw me, and shouted something. They pointed, and the rest turned to look at me.

There was a deadly silence, broken only by the sobbing of the children on the ground.

The soldiers started moving toward me, muttering and hoisting their rifles. I heard Chantlo run to my side and gasp in fear as he saw the soldiers. He shouted something to them, speaking quickly and urgently.

One of them answered in a snarl, and Chantlo answered. They were still advancing, and Chantlo was pulling me backwards as he talked. I was still in shock. Chantlo shook me desperately. "Mister Anderson! Mister Anderson, I said, show them your passport!"

He had been speaking English, but I hadn't noticed. I stared blankly at him. "What do you mean?"

"Mister Anderson, I beg of you! You are required always to carry your passport!"

I began to understand. Oh. I'm supposed to show them my passport. I pulled out something square from my pocket. He grabbed it and showed it to the soldiers.

A soldier took it and stared at me. The others had gathered around so closely that I could hear them breathing. The soldier threw the passport back at Chantlo. Then he gestured to the others, and they went back to their truck, jostling me on their way.

They climbed into the truck and roared away, spattering dirt and gravel. I started toward the children, but Chantlo held me and didn't let me move. He watched until the truck was out of sight among the buildings. Then he let me go and started shouting.

I ran toward the children, and people appeared from huts and buildings, and we all got there about the same time.

One of the children was a little girl, about my grandson Tommy's age. She staggered to her feet, crying loudly, bleeding from several ugly gashes and bruises on her face. A woman scooped the girl up and ran off. Both were sobbing. The other children were grabbed by adults and disappeared.

I looked around, shaking from head to toe. Chantlo was, too.

I grabbed him by the lapels. He was bigger and younger than me, but my adrenaline was pumping full speed. I yelled in his face. "What in the hell is going on around here! I've never seen anything like this in my life!"

He was very upset. "Mister Anderson, please. . . ."

"Those soldiers were beating on little kids!"

"Mister Anderson, please! I will explain, but we must leave here at once!" He dragged me to the car, and the work-

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ers shoved me inside. Chantlo got in and drove in the opposite direction from the army truck.

I tried to talk without a shake in my voice, but I didn't do very well. "What happened back there? Did we almost get killed?"

Chantlo was really upset. "Yes, Mister Anderson. I must beg of you never to do anything like that again."

"What did I do?"

"You surprised the soldiers as they were beating those children. You were a witness. That is not allowed. People are instructed to hide so that they will not be witnesses to the soldiers' activities."

"So why didn't they kill us?"

"I told them that you are under the protection of our government."

"Why were they beating the children?"

Chantlo looked very tired. "The greenhouses have a supply of fresh water from a well dug especially for them. This is because exporting flowers brings hard currency, and is therefore a higher priority than the welfare of the people."

"But why beat the kids?"

"It is difficult to get clean water. So they often use the water at the greenhouse. The workers do not prevent this. The soldiers, however, do not allow it. It is likely that the children did not look for soldiers before getting water. The soldiers wished to set an example."

I digested this for a while. "Thank you for saving me, Chantlo."

"And I thank you, Mister Anderson. Your presence prevented the soldiers from further beating the children, perhaps until some of them died. But they did not dare to harm you."

"Well," I said grimly, "I'm going to make a report as soon as we get back. Those bastards can't get away with something that!"

"That would be very unwise," Chantlo said firmly. "The soldiers are not punished for such deeds. But if you complain, someone may check and discover that you are not as important as I implied."

"But surely we can do something about this!"

He looked at me out of the corners of his eyes. "Mister Anderson, forgive me if I insult you, but you are very American."

I sputtered in surprise. "Why would that be an insult?"

"You do not have such problems in America, and therefore you assume that it can be changed. But it can not be changed. Our elected government was overthrown by cutthroats. Our current government is brutal. This is the life we have been dealt, and many people have been killed trying to change it."

"It sounds pretty grim."

"Indeed, yes. Do you remember the burned field?"

"Sure."

"Soldiers destroyed that field, Mister Anderson. It was the most prosperous field in the area. But we are not allowed prosperity. Hunger is a way to keep the people in submission. That is why I was afraid when the soldiers saw us inspecting that field."

"I just can't believe it," I said.

Chantlo was silent for a while. Then he said, "Mister Anderson, you have been in Thusbammanna for two weeks. There is much suffering and poverty in the capital as well. And yet, you have

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never cared before this day. Why do you now?"

I swallowed. "I'm sorry. I never noticed it. I've been preoccupied."

"I do not know that word."

"I have been . . . very sad." I figured that would do it. "My wife died shortly before I came here. I haven't been able to think of anything else."

He made a religious gesture. "I am sorry for your loss."

I nodded, rather than trust my voice, and looked away over the fields.

"I have lost a child," Chantlo said.

Surprised, I realized that I knew nothing about him. "I—I am sorry for your loss," I said awkwardly.

He nodded graciously.

I fumbled for something to say. "What did your child die of?"

He looked away. "Soldiers killed my son, Mister Anderson. They beat him to death when he would not give them his food."

My vocabulary failed me completely. Words like shocked, aghast, appalled, all were inadequate. Finally, I choked out again, "I am sorry for your loss."

"Thank you," he said with dignity. He paused, and then spoke again. "I went through considerable trouble to keep you from discovering the problems of our country. But you have suddenly become inquisitive. You are an American, and therefore you have not learned fear. I tell you this so that you will now conduct yourself appropriately."

I promised I would.

We finally got back to the capital, and Chantlo dropped me off at my apartment. It wasn't quite four in the afternoon, and I wondered what I should do. I had no friends, or even acquaintances. A wave of loneliness washed over me.

As I got into the elevator, the German couple from my floor hurried in and joined me. They saw who I was, and looked away. I screwed up my courage.

"*Guten Tag*," I said.

They looked very surprised. I wondered how many times they had tried to talk to me, and I hadn't even noticed. The man nodded shortly, and said, "*Guten Tag*."

His wife was a little more forgiving. "*Wie geht es Ihnen, heute?*" she asked.

Well, I had taken German in high school, but that was a long time ago. "I'm sorry," I said, "but I have used all of my German. Do you speak English?"

"Yes," she said. "I asked how you are today."

It was a relief to be talking to somebody on a social basis, and it was nice that they were about my age. We chatted until the elevator reached our floor. I wanted to invite them in, but I had no food in the apartment, and the place was a mess.

Luckily, they invited me to their place. It turned out that my hosts were Helmut and Inge Deckert from Frankfurt, Germany. They were both teachers at the university. I hadn't even known there was a university.

Inge mixed me a drink, and we got settled. I gave them a brief rundown on who I was, what I was doing, and why I had been so quiet. When they heard about Alicia, they warmed up immediately, and said how sorry they were.

"And it is probably best that you are away, *na?*" Helmut asked.

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The old ache was as strong as ever. "It actually hasn't worked out that well," I said. I told them about my two weeks, and my adventures that day.

"This country has a very brutal government," Inge said. "It is sad to see the people. They are only very rich and very poor. Have you seen some of the estates?"

I hadn't seen much of anything.

Helmut said, "The poor people in the city exist only to work for the rich people. There is no middle class; no chance to improve."

We talked some more about the country. The Deckerts were pretty pessimistic. "We come here because we wish to help," Helmut said. "But we can do very little."

Inge nodded. "With the government so corrupt, and with the poor nutrition, and the drought, it is not hopeful."

God, these people couldn't buy a break. We talked about it until we were really depressed, and then after a while, we switched to more pleasant subjects, and chatted a while longer.

I didn't want to overstay my welcome, so I left fairly soon. As we were saying goodbye, the French guy came down the hall, and the Deckerts introduced me to him. Antoine something or other.

It had been a crazy day, but I was glad it happened.

I went to sleep and dreamed that Alicia was being beaten to death by soldiers.

My legs hurt. Fuzzily, I realized that my legs hurt. I stirred slightly, starting to wake up.

Alicia—

A terrible cramp grabbed my left leg, and catapulted me out of the bed. I hobbled around the bedroom in agony, bumping into things with blind pain, until I managed to massage it down. I collapsed onto the bed, my face gray and sweaty with pain.

It was the best morning I'd had in six months.

I was waiting outside the apartment when Chantlo drove up. He hustled out of his seat, but I opened my own door and got in. He hurried around and started the car.

"I hope I have not kept you waiting, Mister Anderson," he said.

"No problem," I said. "I've kept you waiting often enough."

He didn't know what to say.

"Is there a public library in town?" I asked.

"Yes indeed, a very modern facility."

"Let's go there first. I want to learn more about the food situation here."

Chantlo glanced at me, but didn't say anything.

Chantlo seemed to know his way around the library. I flipped through the card catalog, and discovered that most of it was in English. I was fairly pleased with what was available.

As we left, Chantlo asked. "You did not find the books you wanted?"

"Some of them," I said. "But I have to think for a while before I read them."

The next few days kept me pretty busy. I did a lot of research, and I sent a fax to Jane with a list of stuff I wanted her to send me.

I hunted down the assistant to the Minister of Economic Development and

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plied him with questions. I gave him a list of things I'd need to start the chrysanthemum planting. I gave Chantlo a list of books I needed from the library, and had him get them for me, which he was happy to do. I also had him pick me up for lunch every day. Since the Thusbammannan government was paying my way, I spent lots of money on food. Chantlo was happy to join me, and we got along well.

I even invited the Deckerts to my apartment for dinner one night. I'm a lousy cook, but they were very gracious about it. I would have had a good time if I had been able to stop looking at them so enviously. They were a couple. They had each other.

I still didn't sleep well. And mornings were something I dreaded.

Five days after I faxed Jane, a bulky envelope and a small box were waiting by my apartment door. I dragged the stuff inside and ripped it open.

Jane, bless her heart—she had gotten everything. I read her letter first.

"Dear Dad, I was happy and surprised to get your fax. It sounds like you're doing much better. Duane and I went out and got everything tonight. Everything's fine here. On Sunday, Alicia went potty on the pastor's shirt right before the service. He was very gracious about it, but it sure was embarrassing. I don't know if I can show my face in church anymore. Be careful, and take care of yourself. Love, Jane."

I chuckled, then sobered as I wondered what she would think if Chantlo wrote her a newsy letter about his family: "Sorry to hear about your embarrassment in church. That must have been terrible for you. As for our family, our son was beaten to death today. . . ."

The comparison wasn't fair to Jane, I knew, but it was hard to resist.

I spent all evening looking over the books she had sent. I pored over them until late into the night, and actually fell asleep over a nutrition chart in a food chemistry book.

Morning came quietly, and I slowly woke up.

Alicia is—what's on my face?

I had literally fallen asleep on that food chemistry book, and it took a couple of minutes to peel my face off the page.

While waiting for Chantlo, I realized what a difference it made when I wasn't ravaged by the half-sleep dream.

"Good morning, Mister Anderson," he said. "You are looking well."

"Morning, Chantlo. Do you feel up to visiting the greenhouse again?"

A quick flash of apprehension, quickly replaced by pleasure. "Certainly, Mister Anderson. Do you have your passport?"

I produced it, and we both chuckled. But we weren't joking.

We received a royal welcome at the greenhouse. We went into a lot of detail about the future chrysanthemum growing. All of the workers were very interested, and we talked until lunch time.

A woman was waiting for us at the greenhouse door. She spoke quietly to Chantlo, who then turned to me.

"Mister Anderson," he said, "we have been invited to join this woman's family for our noon meal.

"Really? Us? Why?"

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"She is the mother of one of the children who was beaten. She wants to thank you for saving her daughter."

I got very flustered. "Well—that's very nice, but I didn't do anything. I just stood there with my mouth open."

He looked at me reproachfully. "Mister Anderson, it would be ungracious to refuse."

I certainly didn't want to be ungracious. I accepted quickly, and bowed to her, feeling foolish. I wished I knew some of the language, so I could express how touched I was by her offer.

Chantlo and I followed her to her home. It was about a mile away, and I was hot and tired long before we got there. "This is a long way," I puffed to Chantlo. "Especially if you're carrying water."

Chantlo smiled. "Before the well was dug, these villagers walked three miles for drinking water, and a mile for washing water."

I was silent. It had never occurred to me that there would be two kinds of water.

We passed a low building that was larger than the others. A bunch of kids were clustered around. "What's that building?" I asked.

"That is the schoolhouse. The teacher is a member of your country's Peace Corps."

"What are those kids doing?"

"They are tending the school's vegetable garden. The school is expected to be self-supporting in food."

"What do they eat?" I asked innocently.

Chantlo's face darkened. "Corn," he said.

"What else?"

Chantlo sighed. "Very little else. This school serves children for miles around. They are brought by their families to get an education, and go home rarely until they are needed in the fields. They do not get meals from home."

"So they eat corn?"

"Yes, Mister Anderson. They are delivered to the school with a fifty pound sack of corn. They grind it into mush for breakfast. They form some of the mush into a hard cake for lunch. And for dinner they have more corn mush. Sometimes they add something from the garden: some pumpkin or such. But it is rare."

"But that can't be a balanced diet, can it?" I sputtered.

"No, it is not, Mister Anderson. Food is not plentiful here."

I tried to think back to those nutritional charts, but I couldn't remember them.

We reached the hut of our host, and based on what Chantlo had just said, we were treated to a sumptuous banquet. "Chantlo," I said with my mouth full, "Would it be OK if we gave them our lunch food as a gift?"

"I am sure they would be grateful," he said with a smile.

"Ask how her daughter is," I requested.

Chantlo did, and the mother stopped smiling. She let us to another room in the house. "Prepare yourself, Mister Anderson," Chantlo whispered to me. I entered the next room with a feeling of dread.

She had once been a beautiful child, but looking at her now made me sick. Her face and body were covered with oozing scabs and ugly, purple bruises.

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Her eyes were dulled and filmed over. She had been beaten two weeks ago, and not a single wound had healed. She looked at me with huge, dying eyes, and I almost burst into tears. As a kind of defense mechanism, my mind flitted back to the words in one of my textbooks.

"Protein is needed by the body to build and repair tissues. You need protein to build collagen for scar formation, to heal cuts and wounds, for growth of bones and teeth."

It had seemed reasonable when appearing on the dry pages of a textbook. It was appalling when appearing in the dying eyes of a little girl.

"Let's leave her alone," I said thickly. "She deserves her privacy."

Chantlo spoke softly to the child's mother, and we went back into the main room.

"Give them the stuff," I told him. I sat down, feeling weak.

Chantlo gave them our food, and we left.

"Let's go back to the city," I told him. "There are some things I want to check on."

Chantlo dropped me off in front of the apartment, and I hurried upstairs. I wanted to check out the books Jane had sent. I fumbled with the key, and burst into the apartment.

Yeech. It was bleak and dark. My determination started to evaporate. It was bleak and dark because I never opened the curtains. Because Alicia was dead.

I was so full of determination that there was still enough to propel me across the room and rip open the curtains. The sun flooded in, searing my eyes.

I hurried into the bedroom and did the same. Then I scrambled around, dumping my research books onto the kitchen table, making a quick desk. I looked around. Better. You're gonna beat this, Ken.

Before I could pursue that thought any further, I started going through a bunch of nutrition tables. They evaluated the protein levels of different foods. Corn was not anywhere close to a perfect protein. I spent an hour cross-referencing the information on that list to other foods, especially eggs, until I had a better handle on things. I wrote a long letter to Jane that I planned to fax her in the morning, and then I went shopping.

I walked to the store, and bought a bunch of entertaining supplies. I was lonely, and I couldn't just wait until other people invited me over.

I was in luck: that night, I was able to invite Antoine and the Deckerts over for an after-dinner cocktail hour. They brought along a couple from England that was helping modernize a textile factory. Nice people.

The next day, I had Chantlo drive me to the office. The morning hadn't been too bad—you don't have the chance to dwell in the soft gray area between sleeping and waking when you have a hangover.

The letter from Jane came in a week. *"Dear Dad,"* she wrote, *"I was happy to get your fax. You're sounding better and better.*

"I checked with a friend who is married to a nutritionist. He described some

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of the things that happen when you only eat corn, but I don't think you want to hear them. He said that a complete protein is very important because the body can't build and repair tissues without it.

"He also said that the body needs protein to synthesize enzymes to initiate the body's chemical reactions. And protein also supplies energy at a rate of four calories per gram. If there's a shortage of fats or carbohydrates, the protein can convert to glucose to supply energy to the brain and central nervous system. Finally, protein components also serve as the building blocks for hormones and antibodies.

"Proteins are made up of amino acids. There are over twenty-two different kinds of amino acids that can combine to make different sequences for each protein. Of the known amino acids, eight are absolutely essential. They are: Isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine. If you're short in even one of these, you're not getting a complete protein. He says it's like having twenty bicycle seats and forty handlebars, but only two wheels. You end up only being able to make one bicycle.

"There are two other important amino acids. Arginine is required for infants, and histidine may be an essential amino acid for adults.

"Corn is low in tryptophan. It's also low in lysine, so it's a poor quality protein source. Soy protein is a good complement to corn protein, because soybeans are high in tryptophan and lysine, and low in some essential amino acids that corn has a lot of. So together, the two foods do a lot more good than either can do alone. To stretch the analogy, soybeans have a lot of wheels and very few handlebars, so when you combine the two, you can make more bicycles.

"A corn/soy mix is then limited by methionine, but that limit isn't nearly as severe, so you've made a lot of progress. Wheat flour has lots of methionine.

"If you come up with this stuff, make sure people eat it at the same meal, or it doesn't work right.

"When I was researching this, I found an article in a magazine called The Futurist. *I don't know if it's worth anything, but I thought I'd send it along. Love, Jane."*

I studied her letter and the nutrition tables until I had to go to sleep.

I was waiting for Chantlo the next morning. I felt gray and haggard; beat up by my waking. I had dreamed that Alicia and I were in Hawaii, having a wonderful time, and when I woke up and remembered, the disappointment washed over me and almost drowned me.

I bundled into the car. "Let's go to the village near the greenhouse, Chantlo," I said abruptly.

He pulled into traffic. "You are not well, Mister Anderson?"

"I had a bad night. I need to get out of the city. But let's buy some food first."

A few hours later, we were at the hut of the family that had served us lunch. I had been coaching Chantlo on my plan, but I was still nervous. "You'll remember what to say?" I asked him for the hundredth time.

"I have every confidence of suc-

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cess," he assured me.

We were invited in, and Chantlo started talking. By watching what he pulled from the grocery bag, I could follow what he was saying. He produced some soy meal, and talked extensively. "Tryptophan," I thought. "Lysine and histidine." I could tell that he was telling them to mix it with the food they were feeding their daughter.

He pulled out a loaf of wheat bread. "Methionine," I thought. He made gestures to show that the corn/soy paste should be put on the bread. Then he talked emphatically. "It's very important that they are eaten at the same meal," I thought at them.

Chantlo gestured at me and the mother made a kind of curtsey. "She is thanking you for your kindness," Chantlo told me. "You make a small bow if wish to acknowledge."

I did, feeling uncomfortable and tense. "She promises that she will prepare the food immediately," Chantlo said. "We may leave now."

Back in the car, I asked how it had gone. He shook his head. "It is difficult to persuade these people to change their way of doing things," he said. "Much is ingrained in tradition and culture. But I believe I managed to persuade them. They are quite intelligent, and they are willing to try new things because they know their daughter is dying."

"Good job," I told him. "I suppose we should go to the greenhouse now."

I spent a little time with the foreman, and then I read the *Futurist* article that Jane had sent called "Food Without Farms," for the twentieth time, hoping it would help refine the idea brewing in my mind.

* * *

Two weeks later, we were back at the same hut with a load of soy meal. By the time we got out of the car, a crowd had gathered. We were quickly surrounded by people. A little girl came up to me, smiling. With a start of surprise, I recognized her as the dying child of two weeks before.

Her bruises were fading, and most of the swelling had subsided. Her open wounds were scabbed over, clean and strong. She scampered around me, chattering away with a happy smile on her face and smiling eyes.

What a change! What an improvement! I wanted to hug her with joy, but wasn't sure if it was acceptable, so I just beamed at her.

Chantlo joined me, beaming too. There was awe in his eyes.

"Doesn't she look great?" I asked.

"It is truly wonderful!" he said. He asked her something, and she crowed her answer. "I asked her how she was feeling, and she exclaimed that she feels very well," he told me.

"I can tell," I said.

The child's mother came over and talked to Chantlo for a while, and waited with a smile while he translated.

"She has followed our instructions to the letter," he told me. "They consider her recovery to be miraculous, and they extend great thanks to you."

I smiled even more, and bowed to her. The little girl came up to her mother, still chattering. Her mother hugged her affectionately and said something to Chantlo.

Chantlo laughed. "She says that her daughter has never been so noisy before. She never stops talking."

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I chuckled, but felt sobered. The girl never had proper nutrition until now, which explained why she had more energy than ever before. But it would take a long-term, structural change to keep her that way.

Another woman shouldered her way through the crowd and spoke urgently to the mother and Chantlo. Chantlo quickly turned to me.

"Mister Anderson, we have forgotten that three other children were beaten. This is the mother of one of them, and she begs that we heal her child as well."

"God!" I cried. "What was I thinking? Tell her we'll come immediately."

At Chantlo's suggestion, we brought along the mother of the happy girl. "There is more acceptance of something new when it is brought to you by someone you know," he explained. Chantlo was a very sharp guy.

We spent most of the day giving nutrition seminars to the parents of the other beaten children. I hoped it wasn't too late.

I had been planning to do some experiments with the soy meal, but since we gave it all away, there was nothing to do but head back to the city. I sat back, deep in thought.

"You know, Chantlo, something's got to be done. We can't keep on buying this stuff and driving it down. Eventually, the government's going to stop paying for it."

"That is true."

"But they've got to have it. That little girl will suffer from malnutrition again as soon as the soy meal runs out."

Chantlo looked grim. "This is a painful subject for me, Mister Anderson. Do you have a solution?"

I hesitated. "Well, they have to grow more food."

He looked irritated. "You have heard of the drought, Mister Anderson. You have seen the actions of the soldiers."

"They have to grow more food without using any of the fields," I said slowly. "They have to do it in a way that doesn't depend on the weather. And they have to be able to hide it from the soldiers."

"And such a way does *not exist*," Chantlo said bitterly.

I paused. "Actually," I said, "it does. There's this article that my daughter sent me that describes a way of growing food without farms. I don't think it's actually been done outside a lab, but we could give it a try."

"But how does one grow food that way?"

"Basically, you take the food you want—in this case, any kind of soybean. You put it in a vat of some kind, and add growth enzymes."

"What are growth enzymes?"

"They're a kind of chemical additives that tell the soybeans to grow. But they're not ordinary soybeans. They're a kind of bulk soybean tissue. Then you add a sugar-based solution to serve as food. The article talked about grinding up trees, because they're mostly sugar and cellulose. But you have plenty of scrub. Bushes. Weeds. Maybe even parts of corn that aren't edible. There's plenty of junk vegetation around here, but it just isn't the kind you can eat. The beauty of this plan is, you can use the stuff that grows here naturally. It's not bothered by the pests or the climate, and it grows quickly and with no effort.

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So you harvest those plants and grind them up. They become food for the soybean tissue."

He was looking at me strangely. "And what of the soldiers?"

"Each family could have its own food vat, and hide it in the middle of the field. The soldiers won't find them there."

"And would this make enough food?"

"I don't know yet," I confessed. "Probably. Besides, I'm only talking about growing enough soybeans to supplement your corn diet so that you can utilize all of the proteins available. I'm not talking about replacing corn completely."

"So the drought is still a problem."

"I suppose," I admitted. "But if you have a regular soy supplement, you'll have better nutrition even if you have less corn. It will help a lot."

Chantlo had a small grin of excitement on his face for the rest of the drive.

The next several days were hectic. Officials started asking about progress with the chrysanthemums, so I poured myself into that task, and did my experiments in the evenings. During the day, I had Chantlo do research at the library. He turned out to have exceptional research ability, with a very sharp mind and more patience than me.

Through his abilities, we began working as a team. He ended up understanding as much about the idea as I did, which was good. I realized that I wasn't going to be in Thusbammanna forever. The thought was enlightening, but also intimidating, and I shoved it out of my mind. I had things to do.

We worked with our adopted family in the village near the greenhouse, and developed a way to turn the weedlike bushes into a substance acceptable to the soybean vat. We contributed the first soybean meal to act as the starter agent, and slaved away to synthesize the growth enzymes. That was still a problem. We were still relying on the enzymes Jane sent.

The chrysanthemums progressed faster than our secret project, to nobody's surprise. But it was a great day when we found that the amount of soybean tissue had increased in our vat.

In the interests of security, our vat was in a depression in the middle of a farm field. The tools to harvest and grind the native brush were among the other tools in the barn. And the enzyme solution held an inconspicuous place in the kitchen. Any soldier finding any single facet of the operation wouldn't have a clue.

It was Chantlo who suggested developing a code name for our operation. In a weak moment, I suggested the Alicia Project. Before I could change my mind, Chantlo told the family about it.

We experimented with different mixtures of the soy meal, food, and enzymes until we came up with one that seemed to be the optimum concentration. A week after that, we harvested our first synthetically-grown soybean tissue. We had a celebration dinner, with the soy tissue in a place of honor.

Driving back to the city afterwards, I relaxed in satisfaction. I felt that the vat could supply enough soy tissue to meet that family's tryptophan, lysine, and histidine needs if used judiciously. Their diet had been significantly im-

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proved, even if we didn't come up with a methionine-source. Maybe I should just concentrate on spreading the soy technology through the countryside.

Chantlo interrupted my reverie. "Mister Anderson, while I am happy for our success, the limiting factor is not an amino acid. It is the availability of the growth enzyme."

"You're right," I admitted. "It's a problem."

He smiled slightly. "And yet, to any problem, there is surely an American-style solution?"

"That's the theory," I grinned.

"I have an idea that may perhaps work," he said. "May I have the last of your daughter's enzyme shipment?"

I handed it to him. "What's your idea?"

"Please," he said, "allow me a few days, and I will tell you."

I had learned to trust him implicitly.

When Chantlo picked me up two days later, he had a mysterious smile on his face.

"Why are you smiling like that?" I asked.

Without a word, he handed me Jane's last enzyme bottle. Then he handed me another bottle with a similar label. Then another, and another.

"This is great!" I exclaimed. "Is this the same stuff?"

"Indeed," he said proudly.

"Where did you get it?"

"I can explain only in general," he said. "I have a friend who has a friend. Quiet rumors say that he is involved in the opposition movement."

"What opposition movement?" I asked, then wished I hadn't.

He looked at me reproachfully. "And you still do not know a great deal about us," he said.

"I'm sorry," I said contritely.

He nodded graciously. "When our elected government was overthrown by the present band of cutthroats, many people were killed. But there are still many who are brave enough to work in the underground opposition movement. This friend's friend is one of them. I arranged a meeting, and explained Alicia Project to him. He was most enthusiastic, and introduced me to a chemist who is also a member of the opposition. He studied your daughter's sample, and made more of it. He told me that if our plan is successful, arrangements can be made to make a great deal of the substance."

"This is very impressive," I said.

"Distribution remains a problem, but not an overwhelming one," Chantlo continued. "I was inspired by your American-style approach to problems, and was reminded of your war on drugs. An unscrupulous underground manages to distribute illegal drugs in your country. Hopefully, a well-meaning underground in my country can do the same with this substance until there is a way for each family to make its own."

"Why didn't you include me in this?" I asked more out of curiosity than pique.

He cleared his throat. "I am sorry, but they would not meet with you. I was only allowed a meeting because many people guaranteed my honesty. You must understand that if these people are discovered, they would be tortured and executed."

A very sobering thought. "I under-

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stand. Just thank them for me, will you?"

"Certainly, Mister Anderson."

I grinned impulsively. "Let's take it down to the village and present the plan to all of them," I said.

Chantlo smiled smugly. "We are presently heading that way."

A few days later, I trudged from the elevator toward my apartment. I was tired and sweaty. We had spent most of the week in the village, going from hut to hut, recruiting everybody to become involved in Alicia Project. Just about everybody agreed to participate, and we had given them the necessary ingredients and instructions.

The woman from our first house proved to be wonderful at persuading the people to try something new. And everyone had seen the little girl running around the village while the other three beaten children had been lying at home, so they listened eagerly.

By now, the other children were doing well, and their parents had joined our efforts. We had an extensive communication network that was spreading throughout the village, and I figured we would have everyone on-line within a week or so.

I quizzed Chantlo extensively on the way home. Interchange between villages was limited, but adequate for our purposes. The American Peace Corps volunteer had agreed to teach his students about it. And the country's underground would help.

As I got to my door, Helmut Deckert opened his door across the hall.

"Ah, you are there, Ken," he said in his heavily accented English. "I have some news for you."

Weeks of loneliness had taught me to cultivate friendships, no matter how deep in thought I was. "Hello, Helmut," I said. "How are you?"

"*Danke, gut,*" he said. "But I have something that may disturb you. There is a rumor in the government offices that there is a large military operation tonight, targeting your village."

Dread penetrated to my bones. "What do you mean, a large military operation?" I croaked.

"It could consist of several dozen soldiers searching the village for subversive behavior. If they are resisted in any way, they quickly resort to violence."

My blood pounded in my ears. We had left Alicia Projects's implements in everybody's huts, planning to continue training in the morning! What could I do? They'd all be arrested!

Helmut grabbed my arm. "Are you well, Ken?"

"No!" I gasped. "People are going to be killed tonight, and it will be my fault!"

Helmut looked grim. "You must warn them!"

"I don't even have any way of getting there!"

"Take a taxi to your driver's house," he instructed. "You have little time. The soldiers will move when it is dark."

I sprinted for the elevator, Helmut following. "Have you money for a taxi?" he asked when we got to the street.

I searched my pockets wildly, realizing that I was not displaying grace under pressure. He restrained me, and pressed

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a wad of bills into my hand.

"Thank you," I said gratefully. "You've been a good friend."

He pushed me into a taxi and barked instructions at the driver. "Tomorrow you can tell me of your success," he said. "Good luck, my friend!" He slammed the door, and the taxi took off.

We made several wrong turns, but we finally got to Chantlo's tenement. I shoved a bunch of money at the driver, ran out of the car, and pounded on the door. Chantlo answered, staring at me in surprise as I tumbled in, wild-eyed and breathing heavily.

"Mister Anderson!" he exclaimed. "What is wrong?"

I blurted it out as quickly as possible. His expression turned to horror. "We must warn them," he exclaimed. He called out to his family, grabbed his car keys, and bolted for the door.

We dove into the car, and gunned it into traffic.

We drove in silence into the gathering darkness. Finally, we approached the village. Chantlo turned off his lights and we navigated by the light of the Moon.

"The soldiers will be looking for anything suspicious," Chantlo said tensely. "You must not be seen, Mister Anderson."

"You're right." I looked out the window. "Stop the car."

Chantlo did, and I opened the door. "I'll go across the fields, and you go by the roads. One of us ought to make it. How do I say 'soldiers' in Thusbammannana?"

He told me, and I plunged into the fields.

I had a vague idea of where my adopted family's hut was, and I tried to steer that way, trying to make sure that I could last long enough to get to them in time, stumbling constantly, falling and rolling and getting up again, and it occurred to me that I was in much better physical condition than I had been when I arrived. The shadow of the hut loomed up out of the darkness and I almost ran into it. I leaned against it for a minute, then slipped around the side, straining my eyes for an ambush or trap. But there was only the darkness and the muted background insect noise. I peered toward the road. I could see some moving lights.

The soldiers! Their trucks were on the move, and they would get here in a couple of minutes! They must have stopped Chantlo, because I couldn't see our car. I rushed to the door, pounded on it, and burst inside.

The family was gathered around a small fire, and they turned to look at me in shock. I was gasping for breath, dirty from falling in the field, and drenched with sweat. I called out the word for "soldiers" with wild terror in my eyes. They scrambled to their feet with cries of fear. The father spoke quickly to the little girl and her brother. They ran out of the hut. I figured they were going to spread the word about the soldiers.

A demonstration vat was in their living area, filled with the starter stuff for the soy meal. I grabbed the soy meal that was in a bowl and tossed it into the vat. Then I grabbed the vat and carried it outside.

I paused as I turned the corner toward the back of the house. The lights from the soldiers' trucks were a little closer, but there was still time. There was a lot of activity in the village. People were

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moving swiftly and quietly through the darkness. The alarm was spreading, and it looked like they were warned in time.

The little girl came running back home with her brother. Her brother ran into the hut, but she slowed down and gave me a shy smile. I smiled back at her over the vat I was carrying. From the dim light that was coming from the hut, I could see that she still looked healthy.

Her smile got wider, and she gave me a little girl's wave. Before I could wave back, she ducked into the hut. But her little wave made me feel warm all over.

"You're welcome, Sweetheart," I whispered. Then I turned the corner and struck out into the field.

I was puffing and grunting long before I figured it was safe to put down the vat. The soldiers would have to search all night to find it here. Then, hoping my sense of direction wasn't totally screwed up, I headed for the road.

I stumbled onto the road just when I decided I had gone in the wrong direction. It was deserted. My relief at finding it quickly changed to worry. What did I do now?

I started walking away from the village, wondering what had happened to Chantlo. After a while, I heard a motor behind me and I scrambled for cover in the field. To my immense relief, it was Chantlo, driving slowly with no lights.

"Mister Anderson!" he called softly. "Mister Anderson!"

I scrambled out of my hiding place and pounded on the car with relief as I clambered in. "Chantlo! It's good to see you!"

"It is good to see you as well, Mister Anderson. The soldiers stopped me from reaching the village. Can I assume you were more successful?"

"I was! I think I gave them enough warning. The children were spreading the word through the village, and the stuff doesn't take long to hide."

Chantlo smiled. "You have saved them yet again, Mister Anderson."

"It was a close call. Do you think the soldiers will hurt anyone?"

"With the people forwarned, it is doubtful. Everyone will be on their best behavior."

"Then there's nothing to stop the spread of our food technology."

"It would appear so," Chantlo agreed.

It was late in the night when we finally got to my apartment building. I staggered down the hall, and found the Deckerts still waiting for me. I filled them in, and collapsed in bed.

I was awakened just a few hours later by a distant pounding. Slowly, it dragged me out of a deep sleep, and I realized that somebody was pounding on my door. I stumbled to open it.

A Thusbammannan official stood in my doorway, with two policemen with him.

"You are Kenneth Anderson?" he asked.

"Yes," I muttered, trying to recognize him.

"I am an agent of the Thusbammannan security forces. You have been identified as a subversive force to our country."

I was wide awake. "Why?" I asked.

"You are attempting to do more than grow chrysanthemums in our country," he said. "We have conducted checks in villages where you have spent an inordi-

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nate amount of time. You have apparently failed to gain support for your activities, but we do not intend to give you more time to pursue them. Your visa has been canceled."

"Canceled?" I repeated stupidly.

"Precisely," he said. "You are ordered to depart for the United States this morning. By noon today, if you are still here, you will be subject to arrest."

I stared at him blankly. "OK," I said finally.

He turned on his heel and left without a word.

I walked slowly back to my bedroom and sat down. I was being kicked out, right when the project was really starting to take off. Then I realized that the project didn't need me any more. It was up to the people now.

I quickly packed and woke up my friends to say goodbye. They were all sad to see me go, but gave me a warm send-off and promised to spread the word about the Alicia Project. I thanked them for being my friends, and went out to wait for Chantlo.

While I waited I spotted the policemen across the street, keeping an eye on me. Chantlo arrived, and I managed to warn him before he acted like anything but a subservient driver. He loaded my bags into the car, held my door open, and we drove off.

"They are following us," Chantlo reported, checking his mirror.

"They want me out of here," I said.

"This is most grievous, Mister Anderson," he said. "What will we do without you?"

"You don't need me any more, Chantlo," I said. "Alicia Project is off and running. And I'll be doing research in America for an easy way for the people to synthesize the growth hormone. I'll work on ways to produce other foods."

He nodded reluctantly. We spent some time brainstorming ways that I could send information without incriminating him. When we were satisfied that we had several good alternatives, we lapsed into silence.

I sat back and enjoyed the police escort. They wouldn't go to this much trouble for me unless they were really worried about what I had done. If I had worried this corrupt, brutal government, then I figured I'd done something pretty worthwhile.

I felt strange inside, and wondered why. Then I realized: I felt good. I felt happy. How long had it been?

I would always love Alicia. And I would always have a part of me that was sad because she was gone. But I could live again.

Thusbammanna had been the best thing in the world for me. It had focused me outward, instead of concentrating on inner pain. I was glad that Alicia had given me the idea.

I sat up in shock. Yes, she had given me the idea! She had talked about it so much that all of the groundwork had been done before she died. I had just been able to go and sign up! She must have plotted the whole IESC plan because she knew how lost I would be without her.

Why, Alicia, you clever conspirator! You had it all planned out. I fell right into it, and it had worked wonderfully.

Thank you, Alicia.

Chantlo took the turnoff to the airport, and I pulled out of my reverie. He

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glanced at me, and I realized that I was smiling and wiping a tear from my eye.

"You are well, Mister Anderson?"

"Yes, Chantlo, thank you. I'm going to be fine."

He cleared his throat. "We will miss you, Mister Anderson. We are deeply grateful for what you have done for us."

"You have done more for me than I'll ever do for you," I told him. "You've given me back my life. And don't forget, we're not finished. We can do much more."

He nodded and stopped the car next to the airplane. "Yes, Mister Anderson. We have just begun."

We sat there a moment, looking at each other and smiling. "Thanks for all your help, Chantlo," I said.

"And thank you, Mister Anderson."

The plane was waiting. I opened the door to get out of the car, then stopped and closed it again. "Chantlo, I have one thing to tell you. It's very important."

"Yes, Mister Anderson?"

"The name of our project. 'Alicia.' Promise me you'll always call it that. It's the name of my late wife. It's the name of my granddaughter. It's important to me that your people remember them."

Chantlo nodded. "I will see to it," he promised.

I shook his hand and got out of the car, satisfied. I think Alicia would be as happy at the success of my conspiracy as I was at the success of hers. It could end hunger; it could be the first step toward overthrowing their dictator. A whole country would remember Alicia.

Not many people get that kind of immortality.

I couldn't wait to tell my granddaughter about it. ■

The love of life is necessary to the vigorous prosecution of any undertaking.

Samuel Johnson

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THE REFERENCE LIBRARY Tom Easton

To Save the Sun, Ben Bova and A. J. Austin, TOR, $21.95, 379 pp. (ISBN: 0-312-85177-4).
Steel Beach, John Varley, Ace/Putnam, $22.95, 480 pp. (ISBN: 0-399-13759-9).
Briar Rose, Jane Yolen, TOR, $17.95, 185 pp. (ISBN: 0-312-85135-9).
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The Oxford Book of Science Fiction Stories, Tom Shippey, ed., Oxford University Press, $22.50, xxvi + 585 pp. (ISBN: 0-19-214204-6).
The Collected Feghoot, Grendel Briarton, Pulphouse (Box 1227, Eugene, OR 97440), $10, 188 pp. (ISBN: 1-56146-425-2).
Books on Disk

It's hard to ignore a book with Ben Bova's name on it. After all, he spent a few years as the editor of this magazine, which makes it a reasonable presumption that all you Gentle Readers out there would like to know what he's up to now. In addition, he's a hard-SF writer with a very fertile imagination, which would make him worth attending even if he had no connection with this magazine whatsoever.

In his latest, **To Save the Sun,** Ben Bova teams up with A. J. Austin to suppose one of those grand galactic empires with very conventional, traditional sneering villains and noble heroes. But wait a second—the heroes are noble enough, but they aren't really as clichéd as the bad guys, not at all. They're actually pretty believable human beings, and that helps make the story quite convincing.

The empire is a small one, just a hundred worlds. It doesn't have faster-than-light travel, though messages it can manage. It has suspended animation and various rejuvenation techniques, so the slowness of travel is not too much of a problem, except for the emperor, whom tradition requires to live a natural span (beginning only when he takes the throne). Its concerns include the aliens beyond the borders and genetic drift

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within, which threatens to turn some humans alien themselves. There is thus some effort to maintain a baseline, a stock of near-Earth-normal humanity, and where better than on Earth itself?

It is thus a bit of a shock when the empire's scientists emerge from their stagnation to announce that within a few centuries or so, Sol will toast Earth into a little brown cinder. The home planet must be evacuated. But wait! Here is Adela Montgarde with a scheme to rejuvenate Sol itself. It will take centuries, it will be colossally expensive, it will require all-out efforts from all the hundred worlds. But it can be done!

"Stuff and nonsense!" cry the stuffed shirts of tradition and status quo, but the emperor is intrigued, moves the imperial court to Luna, and sets his son in charge of reviving the sun. There is opposition—attempted assassination, sabotage, and more—but eventually the holdouts are either dead or converted.

And no, Bova and Austin never do show the success of the project. Getting there is all the fun of a game of machinations, and their point is that a moribund state can be both revivified and unified by a sufficiently difficult and demanding challenge.

It's a good read—good enough, indeed, for me to predict you'll see it on award ballots.

(Part of this story appeared under the title "He Who Must Die" in the January 1992 issue of *Analog*.)

John Varley provides an "author's note," at the end of his first hardcover novel in almost a decade, to say that though **Steel Beach** may look like it belongs with those earlier works that comprise his "Eight Worlds" future history, it doesn't quite mesh. There are inconsistencies. And if that bothers you, tough.

It doesn't bother *me*. On the other hand, there are also inconsistencies within *Steel Beach*—as when on page 139 Varley has his hero/ine Hildy Johnson, an electronic tabloid or padloid reporter self-named after a certain movie journalist, say "I'm not ever going to have to scrape for my air money," and on p. 147 has him/her say, "air has been free since before I was born." Then there are the nanotech sex changes that apparently go right down to the level of genetically dictated brain wiring and social programming, even though Varley goes to some pains to assure us that mindloads are not yet possible. Or maybe he's really saying that what we think are socially programmed gender differences are really innate, which should bring the feminists down on his neck with a vengeance. Or maybe... He does show us a busted would-be starship called the *Heinlein*, a cult of raving individualists called Heinleiners, a computer that runs the human lunar settlement and has separate personalities for each person to whom it talks, and more, all designed to make us think that he is performing an act of worship before his god.

Unfortunately, he just doesn't have Heinlein's air of conviction. He doesn't convince. He sounds more like he's laughing up his sleeve at the

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way everyone else treats a plaster idol as if it *were* a god.

Steel Beach is set centuries after the Invaders wiped humanity from Earth's surface, apparently to improve the lot of the whales and dolphins. A few humans survived in space, on the Moon and Mars and so on, and they managed to rebuild. By now, life is quite cozy. That lunar Central Computer, known as CC, manages air, water, and information, and only a very few malcontents object. Hildy's mother, for instance, runs a dinosaur ranch which she tries her best to keep clean of all CC's prying eyes; she calls the ranch the CC barred (CC is barred, get it?).

Is there a fly in the ointment? Well, Hildy does keep committing suicide. Fortunately, CC keeps bringing him/her back. In due time, CC justifies this invasion of privacy and self-determination by explaining that it's worried. Too many people are offing themselves. Are they bored with a life that offers no challenges, where even death is a temporary, curable condition, where CC takes care of every little thing, where so much work is makework? Or are they depressed? Actually, says CC, it is itself a mite depressed. Maybe it's caught a software virus from the humans. Or maybe, says Hildy, we caught the virus from you.

CC admits that that's an interesting thought. And it is. Just think of an environment controlled by a computer whose artificial intelligence is so lifelike that it can go crazy. That's not just interesting, but frightening. It also prompts the thought that, for all Varley's bows in the direction of a strong influence on the field, he is actually arguing with some of Heinlein's most famous ideas.

Laughing up his sleeve? Maybe that is precisely what he's doing. Heinlein had a reputation for thinking things through. Varley is saying that he stopped too soon. Yet at the same time Varley is also affirming some very basic Heinleinian values—the primacy of the individual and the need to live free rather than caged even behind golden bars.

Even though Varley is doing some quite interesting things in *Steel Beach*, I found the book too irritating to satisfy.

A few years ago Terri Windling began editing a series of novels that retold classic fairy tales. These were more complex retellings than it may sound, for they amounted to translations into new idioms, new worldviews. In Windling's words, they showed "the diverse uses a modern story-teller can make of traditional material." The earlier titles in the series, published by Ace, were by Steven Brust, Charles de Lint, Kara Dalkey, and Patricia Wrede. Now the series moves to TOR with Jane Yolen's **Briar Rose.**

And here we have a story of such surpassing feeling and resonance that it deserves coverage here even though it is in no way science fiction, and is fantasy only by virtue of that fairy tale connection.

The fairy tale is "Sleeping Beauty." Yolen presents it as a tale told by an immigrant Jewish grandmother,

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Gemma, to her granddaughters, Shana, Sylvia, and Rebecca. Familiar elements are there—the castle, the king and queen and princess, the bad fairy and her evil wish, the sleep, the prince, the kiss of life. There are also strange elements—the bad fairy wears black and eagles, the sleep comes in a rising mist. Add to this that Gemma seems to have no past and even to claim the fairy tale for her own, and . . .

It's all just a story, right? Shana and Sylvia grow up and come to pooh-pooh Gemma's obsession with that same old tale. Becca retains her fascination and when Gemma in due time dies finds in her things a very few cryptic clues. Gemma did not come to the U.S. before World War II, but later, to the one refugee camp on these shores, in Oswego, New York. She retained a few photos. Her nickname once was "Ksiezniczka," Polish for "Princess." She had once filled in a blank that asked for a previous residence, but then crossed the word out so thoroughly that it is readable only with a bit of modern gimmickry as Kulmhof. And Kulmhof was the German renaming of Chelmno, the Polish extermination camp from which no woman escaped alive, and only four men.

The immigrant Jewish element, the eagles, the mist. If the reader did not notice the book's blurbs, these are enough to ensure that the connection to the Nazi death camps comes as no surprise. Yet that connection is not enough for Becca, who must travel to Poland to find as much more of the story as remains to be found. And that "more" is a great deal indeed. Becca learns that there is truth behind many elements of the fairy tale—there is even a "fairy"!—Gemma used as the foundation of her identity for all the days of her post-Holocaust life.

Many scholars would have it that fairy tales are allegories of one kind or another. Certainly Yolen has viewed "Sleeping Beauty" as an allegory of history and made it fit events far more recent than anyone else might have dreamed possible. In the process, she has given the fairy tale a life far more real, more poignant, more convincing than anything the Disney wizards could possibly achieve.

The title is from the diaries of Columbus's first voyage to the New World. The time is Columbus's time. The historical undercurrents are those of the era. The story . . .

Well, we all know what sort of story Esther M. Friesner writes. Comedy, right? Mythic comedy, even, wherein gods and sprites and demons mix it up with modern mortals. The new Thorne Smith, perhaps, though she has more bite than he ever managed.

But that's not all she *can* write, as she proves with **Yesterday We Saw Mermaids**. She still mixes mythic and real, but the humor gives way to the bite in a tale that begins when the Inquisition comes to a small Spanish nunnery to burn several Jews. Garcilaso, the Franciscan priest in charge of the proceedings, is a self-serving bigot. The nuns, except for Ana who chronicles the events that follow, are not much better. The guests . . .

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Among them is Rasha, a woman disguised as a man, carrying a small brass ship which, when she tosses it into the air, becomes a full-sized brass caravel. A witch she is! A sorceress with, what's worst, a demon familiar!

But Rasha is not there to join the holy barbecue. She is there to rescue one of the Jews, a young woman. She winds up also taking the nuns and Garcilaso, and the ship is off, leaping into the sky and then descending to ride the waves to a New World where Prester John rules a magical kingdom that dreads the coming of Christian intolerance. The Jewess, it emerges, is pregnant with a babe that may save the gryphons and dragons and other beasts and peoples of legend.

But intolerance is there as well. Ana must struggle to protect the Jewess and the treasure in her womb from Garcilaso, hating and greedy and mean, but she is only a scribe, only a writer, and in the end the writer's words are all that remain of wonders. Or is that so? The writer also keeps faith with wonders, and thus she helps to maintain their toehold on our mundane world. Perhaps she even helps them return in time.

Friesner mourns the loss of a time when magic seemed much closer than a bookshelf. And she does it so well that we can give her tale a list of adjectives—warm, moving, touching, intense, poetic, tragic—that add up to one simple injunction: Don't miss.

Does the world need another collection of "classic" SF stories? You might be pardoned if your response is a mite skeptical, but the fact is that we've got one. It's **The Oxford Book of Science Fiction Stories,** edited by Tom Shippey, Professor of English Language and Medieval English Literature at the University of Leeds in England, author of *The Road to Middle Earth* and editor of *Fictional Space: Essays on Contemporary Science Fiction.* Its thirty stories range from H. G. Wells's "The Land Ironclads" and Stanley G. Weinbaum's "A Martian Odyssey" to William Gibson's "Burning Chrome" and David Brin's "Piecework."

Shippey's thesis is that "A revealing way of describing science fiction is to say that it is part of a literary mode which one may call 'fabril' . . . opposite of 'pastoral' . . . overwhelmingly urban, disruptive, future-oriented, eager for novelty; its central image is the 'faber', the smith . . . the creator of artifacts in general—metallic, crystalline, genetic, or even social." He notes with relish the epitaph Wells wished for himself: "I told you so. You *damned* fools." He says, "science fiction contains stories of every shade from the naivest optimism . . . to the most luxurious gloom. . . . The common factor is [that] whatever one's theories about the genre, the very existence of [SF] is intimately connected with a growing popular awareness not only of scientific data . . . but of the mingled power and weakness of scientific method itself."

Shippey's "aim is to give an impression of the range, vitality, and literary quality of a genre." It is thus quite fascinating to examine the sources of the thirty stories he chose: Fully ten,

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a third, are from *Astounding/Analog*. If you object that many of those ten must date back a ways, look again: four are post-Campbellian. *Interzone*, *Omni*, *F&SF* and *Amazing* are represented twice each. Two entries come from the *Orbit* anthologies, three from *Galaxy*, one from *New Worlds*, and six from miscellaneous and ancient others. This tally necessarily suggests that *Analog* has a better claim to the soul of SF (as defined by Shippey) than any of its competitors. Or perhaps it's that *Analog* stories have a tendency to remain memorable, seminal stories long after the flashy literary fads visible elsewhere have died; that's how they earn that "classic" status.

Either way, you knew it anyway, didn't you?

As everyone knows, a feghoot is a science-fictional shaggy-dog story starring one Ferdinand Feghoot, who wanders all of space and time with incredible panache, hobnobs with aliens, robots, rulers, cannibals, and scientists, and repeatedly delivers himself of the most atrociously inventive puns. Remember the Nateless Restifs? Pinnace envy? Flying sauce oars? Wild ass pie rations? Steep dill waters? Bards of a fetter floggin' to get 'er?

Once apun a time, Grendel Briarton's creations were a regular feature of *The Magazine of Fantasy and Science Fiction*. The first collection (of 50), *Through Time and Space with Ferdinand Feghoot*, appeared in 1962 from Paradox Press. The second (of 86) was *The Compleat Feghoot*, from Mirage Press in 1975.

Now there is **The Collected Feghoot** from Pulphouse, containing all the feghoots collected earlier plus three dozen more for a grand total of 122 delightful groaners. There is even an introduction, "On the Proper Perpetration of Feghoots."

Even if you don't like puns, you must know someone who likes them less. Buy the book anyway, and then read aloud as long as you're allowed, or until they stone you all the way to tinned-tern abbey and confine you to a little grass shack with an attic full of thrones.

BOOKS ON DISK

A couple of columns back, I told you I was one of the judges for the Disktop Publishing Association's first annual "Digital Quill Awards" for excellence in original electronic publishing (not electronic reissues of classics). The entries for the fiction side of the competition, said DPA chief Ron Albright, were mostly "low-tech writing—personal experience, coming of age, that sort of thing, with about a 50-50 split between that and science fiction entries."

The awards were announced last July (while I was working on this column), and there is enough SF connection in the technology involved as well as in the nature of some of the winners to let you know the results.

More short stories than anything else were entered in the competition. The winner was C. G. Burner's "The Woofbard Curse," concerning a writer whose stories have strange effects on editors and magazines. The

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first runner-up was Mary Ellen Wooford's "Clarice and the Big Red One," in which a dragon rapes an eighteen-wheeler. The second runner-up was William Slattery's "The Morals of the Ethical Woman," in which the woman who teaches an ethics course turns out to . . .

The winning original novel was Anastasia Smith's *Tavern*, published by UserWare (4 Falcon Lane East, Fairport, NY 14450-3312); as it happens, this is an SF novel. The runner-up was A. C. Aarbus's *Southern Discomfort*, published by Del Freeman (Route 1, Box 444, Callahan, FL 32011); it's heavy-handed Southern sociopolitical intrigue.

The winning "Regular Literary Publication" was *Ruby's Pearls*, edited by Del Freeman. A typical issue contains an interesting mix of material, generally including some SF. The runners-up were *Intertext*, edited by Jason Snell, and *QUANTA*, an on-line (internet) only magazine with a heavy SF component edited by Daniel Appelquist.

The winning "Regular Computer/Technical Publication" was *Files and Stuff*, a newsletter edited by Henry Barfoot and Lupe Tingle. The runners-up were *EFFector* (Electronic Frontier Foundation Online), a newsletter edited by Rita M. Rouvalis, and *Z*Net PC*, a newsletter edited by Ron Kovacs.

The winning nonfiction book was Harvey Wheeler's *Virtual Society* (UserWare). The first runner-up was *Fictional Writer's Primer*, by Darvin Harfield and Adam Poszar (Rabid Rhino, Huntington, IN); this is advice to would-be writers in a not-quite consistently humorous, satirical vein that owes more than a little to auto-repair columnists Click & Clack. The second runner-up was *A Hitchhiker's Guide to Science Fiction*, by Ted Husted and Kevin Rhodes (UserWare).

The best software program (shareware or traditionally marketed) designed for publishing text and/or graphics and facilitating their distribution and viewing turned out to be Ted Husted's "DART" (UserWare), which I have praised before. The first runner-up was Jeff Napier's "Writer's Dream" (Another Company). The second runner-up was something called "BDEXX" (by Anthony Hursh, Dead Moose Enterprises), which I have not seen.

A question that must occur to many of you is why, if the Digital Quill entries are any good at all, they don't show up on paper. The answer is not simple. For one thing—and do let me focus on the short stories here—decent stories can miss on-paper publication because there are not that many slots available, because there are other stories the editors think are better, or even because the authors think only in terms of electronic publication. Are the Digital Quill entries decent stories? Some are, and indeed they could fit easily into the pages of many modern magazines. On the other hand, many show a simplicity of structure, a heavy-handedness in plotting and characterization, and a fondness for gimmicks that make one think "old-fashioned." (Such stories are also published on

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paper, of course.) Often the reason seems to be that the authors are still learning; many are college students (*QUANTA* comes from Carnegie Mellon) or other young people.

Does that sound like sneering criticism? I don't think it should. Electronic publishing is a young medium, just as the pulp magazines once were. As a medium, it is still developing. So are its writers and editors. And there is already a great deal of vigor and promise in the field.

One of the most intriguing promises is visible in "Elec-Mags" such as *Ruby's Pearls*, which mix genres and thereby break down a barrier print has been building for most of this century.

Another is that fifty percent of the entries are SF, which says SF will not be left behind as this new medium develops. It also suggests that SF may have some special appeal to people who are "techy" enough to be comfortable with the medium in its youth; I'm sure this does not surprise *Analog* readers.

Still another promise is of an explosion of small-press activity and self-publishing. Electronic publishing is immensely cheaper than traditional publishing. It does not need paper or printers. The product is light in weight, economically shippable, handicapped accessible, and recyclable. And there is no dependence on distributors or bookstores, though that may come in the future.

The problem in all this lies in the self-publishing, where the lack of an editorial screen can mean pretty dreadful product. On the other hand, on-paper commercial and small-press publishing can have the same result, which is why reviewers exist.

The DPA's Digital Quill Awards should help by pointing people toward the best examples of the new medium. At this point, this may be especially important in the case of display programs such as DART and "Elec-Mags" such as *Ruby's Pearls*. ■

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BRASS TACKS

Dear Dr. Schmidt,

In re Mr. Rollins's story "Not Enough To Go Around" (July '92). It seems that SF cliche #392 has reared its ugly head: y'see, God (or gods) is really a group of telepathic aliens working behind the scenes. If plausibility is one of your editorial criteria, I have to ask how plausible is 500 million aliens hanging around here for millenia just for the thrill of invading our heads and pulling various strings. Do you suppose that any culture would be so homogenous and single-minded as to get all its members involved in a single hobby? Picture the entire population of Europe getting involved with the daily lives of African chimpanzees via remote sensing equipment, implants, and so on. C'mon, now!

Also questionable is Mr. Rollins's implication that human religious experience cannot be explained by more prosaic reasons such as our need to make sense out of a big, bewildering universe. Though I am agnostic myself, I would also allow that it is possible that there is some kind of higher spiritual being that some choose to call God.

The premise that religion is in decline may be supportable, but it seems more likely that other factors—global communication, ascendance of science and technology, fragmentation of traditional social units, and the secularization of ideology—might better account for it than that telepathic aliens are suffering burnout!

What really upset me was the attitude (which the late Dr. Asimov has railed against) that humanity, on its own, couldn't have achieved modern civilization, that our accomplishments must have been grown out of, or been influenced by, the intervention of aliens. Hey, I guess we're just a bunch of stupid apes and if it weren't for humming black monoliths, and shining flying saucer/chariots, and 500 million alien telepaths we'd all be poking twigs into termite mounds for our supper!

PATRICK NELSON

236 NW 14th St.
Corvallis, OR 97330

The author replies. . . .

Stan was kind enough to forward a copy of Patrick Nelson's letter to me. I'll take his points in the order in which he raises them.

1) SF cliche #392: I think it's safe to say that most of the possible plot lines have already been invented . . . and used . . . and used. Face it,

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most of the basic plot devices were already old when Shakespeare first dipped his quill into the ink bottle.

I guess it's just as well that I chose not to embellish the story with general fiction cliche #7: boy meets girl. I'm sure Mister Nelson would have reacted quite strongly to such a threadbare theme as that.

2) As of this writing, Europe seems to be having trouble agreeing on a common currency, much less on whether to supervise chimps in their spare time.

Mister Nelson presumes to judge a hypothetical alien psychology, using our own as a measuring stick. So far, we have no knowledge of any alien civilizations, but I, for one, would be very surprised if they turned out to be anything remotely like us.

3) Re: Human religious experience and the decline of religion. Mister Nelson identifies himself as an agnostic, which, by definition, means someone who does not know if there is a living divine being or not. And yet, I find myself wondering at his hostile tone.

GREY ROLLINS

Dear Stan,

Your July editorial on straw-man arguments was superb!

One pervasive trend in the thinking of self-styled experts that leads them to use straw-man arguments and other kinds of fallacious reasoning is mumpsimus. "Mumpsimus" is one of my two favorite expressions in the English language. It refers to one's tendency to continue to act as in the past, even if one suspects or knows the action is inappropriate, merely because one has always acted that way.

While a professor of communication at the Air University back in the '50s and early '60s, I once suggested to a class of Air War College students that if World War III ever happened, they should never assign command of a combat unit to any officer who had successfully commanded a combat unit in WW II. Clearly appalled, they demanded an explanation. I replied that, human nature being what it is, when such an officer got in a real clutch he'd reflexively rely on what worked in WW II, probably with disastrous results. I was never invited back to the AWC!

I hadn't then learned the word, mumpsimus, more's the pity. Fortunately, I'd learned it and was therefore aware of it, by the time the Army (under the aegis of the newly-formed Defense Language Institute) scooped me up. I was director of Training Development for what had been the Air Force Language School, which taught English to foreign military personnel destined to attend various DoD schools. Although I was doing precisely the same job, my non-productive paperwork approximately doubled under the Army. Most of the increase was attributable to mumpsimus; "Army schools have always reported, requested authorizations, etc., this way, therefore. . . ."

If you ever decide to write an editorial on mumpsimus, feel free to quote me. Or if you like, I'll write one for you.

FRANCIS CARTIER

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P.S. My other favorite expression, coined by Dr. Edgar Dale long before there were computer manuals, is COIK, acronym for Clear Only If Known. (Lord! I wish I'd said that first!)

P.P.S. Experience is a great teacher, but even experience can't teach an inattentive student. (I *did* say *that* first!)

Dear Stan

Thank you! For over 20 years I have been delighted to receive *Analog* into my home and into my imagination. The July 1992 issue made me feel very good, and I just wanted to say, "THANKS!!"

One letter did disturb me. Mr. Don Krebs wrote accusing you of bashing those that believe in God. I have failed to notice that you or the stories that you have published did that. You have taken on those that always know what is better for other people. That other people might object to such an imposition does not stop those that know better.

I am working on the final class that I will teach of a nine-month, non-denominational Bible study called *Kerygma: the Bible in Depth*. Besides being a study of the whole Bible, its aim "is not to make the Bible fit some doctrine, but rather to let it speak for itself." Sometimes, those that know better do not necessarily "let the Bible speak for itself."

Of course, those that know better probably do not realize—as the biblical scholars do—that: "There are over 5,200 Greek New Testaments manuscripts, no two of which are alike."[1] And, that does not even count the Dead Sea Scrolls manuscripts.

All Christians are "born-again" by definition. Saying that you are a born-again Christian is like saying you want chili con carne with meat for lunch—it's redundant.

We are all children of God, no matter what our age may be. We all need to grow continually in our minds. *Analog*, science fiction, and fantasy help me to do that, and I thank you.

STEPHEN B. STOVALL

Plano, TX

Dear Dr. Schmidt,

I just read your July editorial and Brass Tacks. I was impressed with the letter from Don Krebs. I am glad that he wrote to you and expressed his reasons for not resubscribing to *Analog* rather than just silently becoming a former subscriber.

Though I do not feel the need to make such a vote with my check book, I can identify with the feelings Mr. Krebs expresses. There have been stories in the past, that while not directly critical of "religious" people and their beliefs, have these people often depicted as obstacles to change, blind followers against science, and progress of any kind. Phrases like "the will of God" and "If god meant us to *blank*, he would have *blank*" seem to come from these characters' mouths. Like most cliches, these phrases have some basis

[1]Sanders, James A., Shanks, H., Vanderkam, J., and McCarter, P., Jr., 1991, *The Dead Sea Scrolls After Forty Years*, p. 61, Biblical Archaeology Society, Washington, DC.

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in fact but real people are much more complex than that. Mr. Krebs found some of *Analog*'s recent stories unacceptable and is showing his displeasure in the best way.

Since he doesn't mention any particular story, I can't offer my own opinion as to whether I found them offensive. Every now and then, though, I have found a story in *Analog* about religion or some religious-based movement that usually pits this movement against the forces of progress. These stories tend to be one-sided, lacking the complexity that is inherent in the real world. Even in stories having nothing to do with religion, the author often makes it very clear who is "good" and who is "bad" by having each character be a type. I have often found such stories poorly written and unbelievable.

How, then, can a story I hardly believe in be offensive? The offensive part of such a story is that the author has created a "Straw Man" in just the way you defined it in the editorial. Authors often seem to know little about the type of character that they are trying to create. These types, while often conforming to the images found in the popular media, ring both false and mocking (intended or not), to the people they supposedly represent. From the readers' point of view, this is a great disservice; an author should strive to show us new things about the familiar and identifiable aspects of the alien, particularly in science fiction.

Don't elevate such stories above the level they deserve by treating them as if they make legitimate arguments against "...people who attempted to impose dictates of their religious beliefs on others...," as you said in your response to Mr. Krebs. Such stories may have their points, some of which I would probably agree with. But it is unfair to say that all of these stories have made a legitimate attack on their target because many of them have failed to accurately and realistically describe their opponents. As you said in this month's editorial, "...oversimplifications and exaggerations are quite inappropriate, and counterproductive, in serious argument."

Stories are not in the same league as the intellectual debates in your editorials, but if we are to believe that they have a valid argument, the conflict must be presented in a realistic form. Obviously, not every story is able to meet such a standard but it is worth the author's, the editor's, and the reader's time for the effort to be made. Not only will the stories be better, but people can gain a greater understanding of and become more familiar with other's thoughts and be more prepared to decide whether they agree with them or not.

ROBERT G. WERNER

Sanger, CA

It's true that some stories don't make their points with the finesse that they should; this doesn't invalidate their points, but it does make them less convincing. One of the reasons I wrote the July editorial was to gently nudge writers to be more careful about precisely the point you mention.

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Dear Stan,

I was thoroughly impressed with Geoffrey A. Landis's article, "The Demon Under Hawaii," raising the notion that an interstellar anti-matter-driven ship was buried 60 miles down under the Hawaiian Island chain (July '92). I saw some article recently discussing "thermal plumes" which were touted as the source of the Hawaiian Island chain.

Mr. Landis raised several interesting speculations. But one thing in particular caught my eye. He says the Hawaiian Island chain has been around for *approximately seventy million years*. And Luis Alvarez showed that some event (assumed to be a large meteor impact) in the Cretaceous era wiped out the dinosaurs, *approximately sixty-five million years ago*. Given the uncertainty of the dating, that's quite a coincidence. I know, I know—recent research puts the impact zone somewhere in the Caribbean. But suppose recent research is wrong?

We can always count on *Analog* for provocative articles.

HENRY MCGILTON

Portola Valley, CA

* * *

To: Mr. Geoffrey A. Landis

Re: "The Demon Under Hawaii"

It appears your antimatter has successfully annihilated a major portion of our neighbor islands. Last time I looked, Maui, Kahoolawe, Lanai and Molokai were floating there between Hawaii and Oahu; in fact, I'm looking at Molokai right now—due east outside the living-room window. And by the way, on Oahu we live on top of *dormant* volcanoes. They are not considered active. And further, the *easternmost member* is not the Big Island of Hawaii. It's the new keiki (new kid on the block) Loihi. We keep on moving over that "hot spot" just like that irritating TV rabbit with the drum.

Interesting theory, about the crashed spaceship. Now that we've begun Geothermal energy development on the Big Isle, we may find more than we bargained for.

Nancy Bigelow

Honolulu, HI

The author replies. . . .

Oops—that one slipped by me. I meant to write that the next *volcano* west of the Big Island was on Oahu, not the next *island* west. ■

Knowledge comes, but wisdom lingers.

Alfred, Lord Tennyson

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UPCOMING EVENTS Anthony Lewis

4-6 March

WORLD HORROR CONVENTION 3 at Sheraton Hotel, Stamford, Conn. Writer Guests of Honor—Peter Straub, Les Daniels; Artist Guests of Honor—J. K. Potter, Stephen Gervais; Special Media Guest—John Zacherle (tentative); MC—Stanley Wiater. Limited to 1000. Registration—$75 attending; $25 supporting. Info: World Horror Convention, Box 191, Andover CT 06232.

5-7 March

ASTRONOMICON 2 (Rochester, N.Y. area SF conference) at the Radisson Inn, Rochester, N. Y. Guest of Honor—Michael Swanwick; Artist Guest of Honor—Phil Foglio; Special Guests—The Gunderson Corp. [SF Comedy Troupe]. Registration—$20 until 1 February; $25 at the door. Info: Rochester Fantasy Fans, P O Box 1701, Rochester NY 14603-1701. (716)342-4697.

19-21 March

LUNACON '93 (New York area SF conference) at Rye Town Hilton, Rye Brook, N. Y. Guest of Honor—Orson Scott Card; Artist Guest of Honor—Barclay Shaw; Publishing Guest of Honor—Richard Curtis. Info: Lunacon 93, Box 338, New York NY 10150-0338.

19-21 March

CRACKERCON 2 (northern Florida SF conference) at Holiday Inn Baymeadows, Jacksonville, Fla. Guest of Honor—Ben Bova; Artist Guest of Honor—Jeff Adams; Very Special Guest—Walter Miller, Jr.; Best Buddy—Jack Haldeman III. Registration—$20 until 15 February, probably more at the door. Info: CrackerCon, P O Box 8356, Jacksonville FL 32239-8356.

2-6 September

CONFRANCISCO (51st World Science Fiction Convention) at Parc 55, ANA Hotels, Moskone Centre, San Francisco, Calif. Guest of Honor—Larry Niven; Artist Guest of Honor—Alicia Austin; Fan Guests of Honor—Tom Digby and jan howard finder; MC—Guy Gavriel Kay. Registration—$85 adult/$30 child until 30 September 1992. Supporting—$25. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: 712 Bancroft Rd, #1993, Walnut Creek CA 94598. (510) 945-1993. CompuServe 72377,3623.

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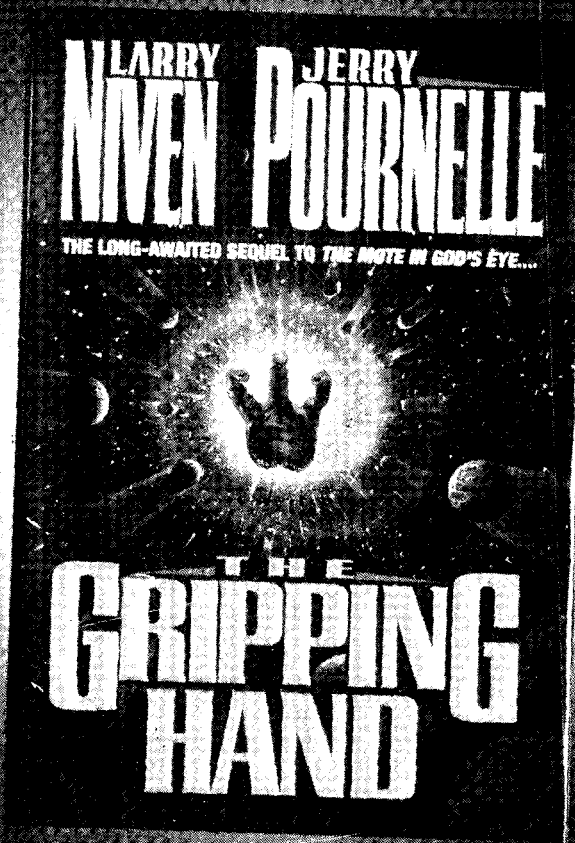

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